SERVICE RESPONSE CENTER

HITACHI

MODEL VC-6020
DIGITAL STORAGE OSCILLOSCOPE

SERVICE MANUAL

Hitachi Denshi, Ltd.

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1. SPECIFICATIONS

CRT

Type	Large 6" screen with internal graticule. Approximate 2 kV acceleration potential.
Phosphor	P31
Graticule	8 x 10 div (1 div = 10 mm) internal graticule
Focusing	Possible (with automatic focus correction circuit)
Trace rotation	Present
Brightness adjustment	Provided
Scale illumination	Variable

Z-AXIS INPUT (INTENSITY MODULATION)

DC-coupled, positive-going signal decreases intensity:	5 Vp-p signal causes noticeable modulation at normal intensity setting.
Usable frequency band	DC to 2 MHz
Input impedance	47 k ohms (typical)
Maximum input voltage	30 V (DC + peak AC)

VERTICAL DEFLECTION SYSTEM (2 identical channels)

Bandwidth (and rise time)	X1: DC to at least 20 MHz (17.5 ns or less) X5: DC to at least 7 MHz (50 ns or less at magnifier extends) AC coupled, lower break point (-3 dB): 10 Hz or less.
Deflection factor	o 5 mV/div to 5 V/div (in 10 calibrated steps in a 1-2-5 sequence.) o Uncalibrated continuous control extends deflection factor to at least 12.5 V per division in the 5 V/div position. o X5 MAG increases sensitivity of each deflection factor setting to 1 mV/div.

Accuracy	X1: ±3 % X5: ±5 %
Display modes	CH1, CH2 (normal or invert), Alternate, Chopped (approximate 250 kHz), Added
Input impedance	1 M-ohm in parallel with 30 pF approx.
Maximum input voltage	300 V (DC + peak AC) or 500 Vp-p AC at 1 kHz or less
Input coupling	AC-GND-DC
DC offset	±1 to ±100 V (Uncalibrated when in V. UNCAL or/and V.MAG mode)
DC offset volt out	At least ±1 V

HORIZONTAL DEFLECTION SYSTEM

Sweep time	o Non store mode; 0.2 μs/div to 0.2 s/div (1-2-5 sequence of 19 steps) o Normal mode; 0.1 ms/div to 0.2 s/div (1-2-5 sequence of 11 steps) o Roll mode; 2 s/div to 20 s/div (1-2-5 sequence of 4 steps)
Maximum sweep time	100 ns/div (at MAG X10)
Sweep time variable	2.5 times or more (with calibrated detent)
Accuracy	±3 %
Sweep magnifying	X10, Accuracy; ±5 %

TRIGGERING SYSTEM

Trigger modes	Automatic, Normal, TV (TV-H or TV-V)
Trigger source	Internal (CH1, CH2, V-MODE), Line, External
Trigger slope	+, -
TV sync polarity	TV (-)

Triggering sensitivity and frequency

Frequency	Internal (V.MODE)	External
20 Hz to 2 MHz	0.5 div (2.0 div)	200 mV
2 MHz to 20 MHz	1.5 div (3.0 div)	800 mV

TV sensitivity	SYNC section less 1 div or 1 V
Minimum frequency of triggering signal in AUTO mode	Approximately 25 Hz
Trigger coupling	AC: 25 Hz to full bandwidth DC: DC to full bandwidth
External trigger input impedance	Approximately 1 M-ohm in parallel with 30 pF
Maximum input voltage	300 V (DC+AC peak) at 1 kHz or less

X-Y OPERATION (CH1: X, CH2: Y)

Note: X-Y operation is possible in oscilloscope mode (NON STORE) only.

Deflection factor	Same as vertical deflection
X-bandwidth	DC to at least 500 kHz
Phase error	3° or less from DC to 50 kHz

CALIBRATOR

An approximate 1 kHz frequence 0.5 V (±3 %) square wave

SIGNAL OUTPUT

CH1 VERT SIGNAL OUTPUT

Output voltage is at least 20 mV/div into a 50-ohm load.

Bandwidth is DC to at least 5 MHz.

DIGITAL STORAGE

WAVEFORM STORAGE

Memory capacity	1 K words/CH x 2 (1 word = 1 byte = 8 bits)
Vertical resolution	25 levels/div (8 bits/10 div)
Horizontal resolution	100 samples/div, each channel
Maximum sampling clock rate	1 MHz at .1 ms/div

DATA ACQUISITION

NORM storage mode	Refresh the data by each triggering
HOLD mode	Holds the waveform displayed on the CRT by the HOLD switch.
SINGLE sweep	Renews the display by the first trigger and no more trigger is actuated.
ROLL mode	Shifts the data right to left consequently on the CRT. (Renewed point is the right end.)

PRE-TRIGGER

0, 2, 5, 8 div (4 steps)

PLOT OUTPUT

Y axis output 1 V/div $\pm$2 % of full scale
(Two channels simultaneously or CH1 or CH2)
Output time: Three steps switching
(1, 5 and 10 s/div)
Pen lift: TTL negative
Fan out 1

DIGITAL OUTPUT

Provides data by GPIB interface.
Available output and input function.
Data: (Measurement conditions and waveform)
Measurement conditions:
Vertical mode, TIME/DIV, Pretrigger

Waveform: Decimal progression
(By block transfer system)

POWER SUPPLY

VOLTAGE	FUSE
100 V (90 to 110 V)	2 A
120 V (108 to 132 V)	2 A
220 V (198 to 242 V)	1 A
240 V (216 to 264 V)	1 A

Frequency	50 to 60 Hz, 400 Hz
Power consumption	Approx. 50 W

ENVIRONMENT

Operation temperature	0 to +40°C(+32 to +104°F)
Operation humidity	35 to 85 %
Temperature for guaranteed specifications	+10 to +35°C(+50 to +95°F)
Humidity for guaranteed specifications	45 to 85 %
Storage and transport temperature	-20 to +70°C(-4 to +158°F)
Storage and transport humidity	35 to 85 %(70 % of less in the temperature of 50°C/114°F)

DIMENSIONS AND WEIGHT

Dimensions	Approx. 310(W) x 130(H) x 370(D) mm [12.4(W) x5.2(H) x 14.8(D) inch]
Weight	Approx. 9 kg (20 lb.)

2. COMPOSITION

(1) Model VC-6020 Digital Storage Oscilloscope 1
(2) Prove (AT-10 AK 1.5) 2
(3) Power supply cord 1
(4) Operation Manual 1
(5) Dustproof Cover 1

3. PREVENTIVE MAINTENANCE

Preventive maintenance, when performed on a regular basis, can prevent instrument breakdown and may improve the reliability of the oscilloscope. The severity of environment to which this instrument is subjected will determine the frequency of maintenance. A preventive maintenance is recommended to be performed before preceding recalibration of the instrument.

Disassembly

Remove all of the screws on the top cover of the instrument, then gently remove the top cover.

Take the same procedure for the bottom cover.

Most of the internal parts of the instrument are now accessible.

(See section 10. Exploded view)

Cleaning

The instrument should be cleaned as often as the operating conditions require, since the accumulation of dirt in the instrument may cause the component breakdown.

The covers can provide protection against dust in the interior of the instrument. Loose dust accumulated on these covers can be removed with a soft cloth or small brush.

Dirt that remains can be removed with a soft cloth dampened in a mild solution of detergent. Abrasive cleaners should not be used.

Cleaning the interior should only be occasionally necessary. The best way to clean the interior is to blow off the dust with a dry, low-velocity

stream of air. A soft-bristle brush or a cotton-tipped applicator is useful for cleaning in narrow spaces or for cleaning more delicate components.

Visual Inspection

The instrument should be inspected occasionally for such defects as broken connections, improperly seated transistors, damaged circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is apparant; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the instrument; therefore, correcting the cause of the overheating is important to prevent recurrance of the damage.

4. CALIBRATION

Hitachi Denshi, Ltd. Provides complete instrument repair and recalibration at our office, and authorized dealer. Contact your local Hitachi Denshi sales office or representative.

4.1 Calibration interval

To maintain instrument accuracy, perform the calibration of the VC-6020, at least every 1000 hours of operations or every six month if used infrequently.

4.2 Test equipment required

The following test equipment and accessories, or its equivalent, are required for the complete calibration of the VC-6020. Specifications given for the test equipment are the minimum necessary for accurate calibration. Therefore, the specifications of any test equipment used must meet or exceed the listed specifications. All the test equipment is assumed to be correctly calibrated and operated within the listed specification. Operating instructions for the test equipment are not given in this procedure. Refer to the instruction manual for the test equipment if more information is needed.

4.3 Preliminary procedure

This instrument should be calibrated at an ambient temperature of +20°C(±5°C) for best overall accuracy.

(1) Connect the instrument to AC line voltage, 50/60 Hz line source.

(2) Set the instrument controls as given in the preliminary control settings. Allow at least fifteen minutes of warmup before proceeding.

(3) See the adjustment locations shown in section 6.

Table 4-1 TEST EQUIPMENT REQUIRED

Description	Minimum specification	Usage	Example of applicable test equipment
1. Constant amplitude signal generator	50 kHz reference frequency; maximum frequency 70 MHz; variable amplitude	Check horizontal, vertical and trigger bandwith.	
2. Standard amplitude calibrator	Amplitude accuracy: 0.25%, variable amplitude; 5mV to 40 V; frequency: 1 kHz square wave	Check horizontal and vertical gain.	
3. Square-wave generator	Variable frequency: 10 Hz to 1 MHz: output amplitude: 10 mV to 100 V	Check probe and vertical compensation.	
4. Digital voltmeter	0.1 % accuracy	Check power supply.	
5. Time mark generator	0.1 % accuracy	Check horizontal timing.	
6. Cable	Impedance, 50 ohms; type, RG-58/U; length, 4 inches, connectors, BNC	External trigger operation check. Horizontal gain check and adjustment.	Hitachi part No. 4202
7. Termination	Impedance, 50 ohms; connectors, BNC	Vertical amplifier compensation checks and adjustment.	
8. Attenuator	Ratio, 1/10; connectors, BNC; impedance, 50 ohms	Vertical amplifier bandwidth check.	
9. T-connector	Connectors, BNC	External trigger operation checks.	Hitachi part No. 1301

4.4 Preliminary control settings

Set the instrument controls as follows, when starting the calibration procedures.

Controls	Settings	Controls	Settings
FOCUS	Midrange		
TRACE ROTATION	As desired		
- VERT -			
V.POSITION	Midrange, pushed in	SWP VAR	Fully clockwise
V.VARIABLE	CAL, fully clockwise		
INPUT COUPLING	GND (AC-GND-DC)	- TRIG -	
VOLTS/DIV	5 mV/DIV		
V.MODE	CH1	LEVEL	Midrange, normal
CH2 INV	Normal, Pushed in	SLOPE	+ Normal
- HORZ -			
H.POSITION	Midrange	MODE	AUTO
PULL X10 MAG	Normal, Pushed in	SOURCE	INT
TIME/DIV	1 ms	INT TRIG	CH1

4.5 Initial starting procedure

(1) Rotate the INTENsity control to the midrange, set the POWER switch to ON.

(2) Wait a few seconds for the cathod ray tube (CRT) to warm up. A trace should appear on the CRT.

(3) If trace disappears, increase (clockwise) the INTENsity control setting until the trace is easily observed, or roughly check/adjust the DC balance to get a trace as same as (13).

(4) Adjust the FOCUS control for the best focused display.

(5) Readjust the POSITION controls if necessary, to center the trace.

POWER SUPPLY SYSTEM

NOTE

Before you start operation, see the adjustment locations shown in section 6.

Control settings

Preset the controls as given in the preliminary control setting.

(1) Check low-voltage supply, if necessary.

a. Connect the digital voltmeter (DVM) between the +8 V line (P1105-2) and ground
: +7.7 to +8.3 V

b. Connect the DVM between the -8 V line (P1105-4) and ground
: -8.3 to -7.7 V

c. Connect the DVM between the +5 V line (P1105-3) and ground
: +4.8 to +5.2 V

d. Connect the DVM from the +120 V line (P1105-1) and ground
: +110 to +130 V

(2) Check high voltage supply.

a. Connect the DVM to the H.V. test point (P1001-1) with a high voltage probe.

b. Check for a reading of -1.995 to -1.805 kV

DISPLAY

Control setting

Preset the controls as given in the preliminary control setting.

(3) Check/adjust CRT bias.

Set the Trig MODE switch to the AUTO, and set the TIME/DIV switch to the 1 ms.

a. Connect the digital voltmeter (DVM) to the R904 (or D1022-(A)) and ground.

b. Adjust the INTENSITY control so that the DVM indicates 15.0 V.

c. Observe the trace of CRT.

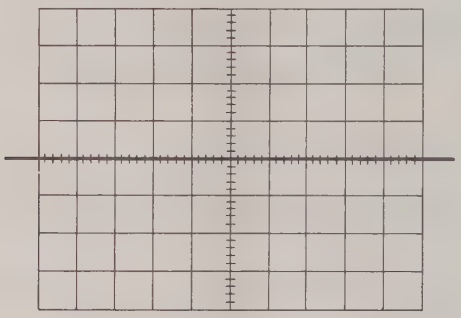
d. Adjust the grid bias adjustment RV1021 for the trace makes a just appear.

(4) Check/adjust trace rotation.

a. Position the trace to the center graticule line.

b. Check that the trace is in parallel with the center horizontal line.

c. Adjust TRACE ROTATION (screwdriver adjustment on front panel) for a trace that is in parallel with the horizontal graticule lines.



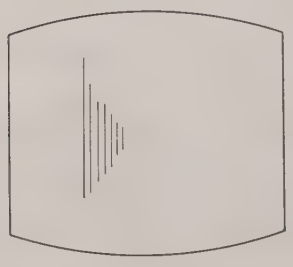
(5) Check GEOMetry

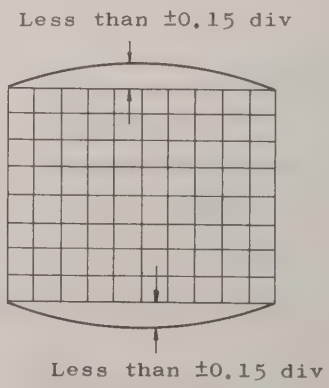
a. Set the TIME/DIV to the 0.1 ms, and the input coupling switch to DC.

b. Connect the constant amplitude signal generator to the input.

c. Set the VOLTS/DIV switch setting for a full-screen (8 division) deflection.

d. Check that horizontal bowing is less than $\pm$0.15 division.

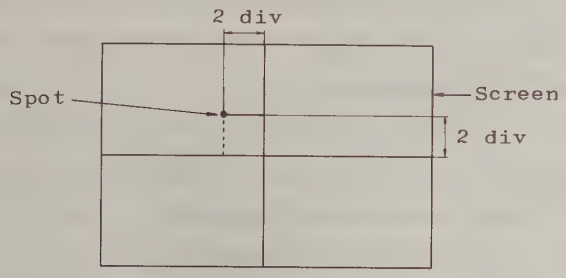




⑥ Check/adjust ASTIGmatism and FOCUS.

a. Set the TIME/DIV switch to the X-Y position, and the input coupling switch to GND.

b. Set the INTENsity control for a small spot, as the following figure, using the position controls.



c. Check that the spot is round.

d. Adjust the FOCUS adjustment and ASTIG adjustment RV1035 for a round spot.

HORIZONTAL SYSTEM

Control settings

Preset the controls as given in the preliminary control settings.

⑦ Check/adjust horizontal gain.

a. Set the input AC-GND-DC to DC.

b. Connect the cable to the output of the time mark generator.

c. Set the time mark generator for 1 ms time marks.

d. Check that the time marks align with the graticule lines over the center eight divisions, within 3 %.

e. Adjust the H GAIN adjustment RV824 so that the time marks coincide with the middle eight graticule lines.

⑧ Check/adjust Horizontal X10 MAG Gain.

a. Set the TIME/DIV switch to 1 ms.

b. Set X10 MAG (pull out the knob of the POSITION control).

c. Check that the one-cycle time marks align with the ten-divisions graticule lines, within 5 %.

d. Adjust the MAG GAIN adjustment RV831 so that one-cycle time marks coincide with the ten-division graticule lines.

e. Push in the POSITION control after adjustment and check.

(9) Check/adjust MAG CENT.

a. Set the TIME/DIV switch to 1 ms.

b. So that the knob of H. POSITION is pulled out (X10 MAG), the left end of the trace is brought to the center point and then the knob of H. POSITION is depressed.

c. Observe the movement of the left end of the trace.

d. Adjust the MAG CENT adjustment RV821 for the movement of the left end of the trace within $\pm$0.2 div.

(10) Check/adjust low speed sweep accuracy.

a. Set the time mark generator for 10 ms time marks.

b. Set the TIME/DIV switch to 10 ms.

c. Check that the time marks align with the graticule lines over the middle eight divisions, within 3 %.

d. Adjust the 10 ms/DIV adjustment RV542 so that the time marks coincide with the middle eight graticule lines.

(11) Check/adjust high speed sweep accuracy.

a. Set the input coupling switch to DC.

b. Set the time mark generator for 2 μs time marks.

c. Set the TIME/DIV switch to 2 μs.

d. Check that the time marks align with the graticule lines over the middle eight divisions.

e. Adjust CV520 so that the time marks coincide with middle eight graticule lines.

(12) Check/adjust high speed X10 MAG GAIN

a. Set the TIME/DIV switch to the 2 μs.

b. Set X10 MAG (pull out the knob of the POSITION control).

c. Check that the one-cycle time marks align with the ten-divisions graticule lines, within 5 %.

d. Adjust the high speed Mag gain adjustment CV840 so that one-cycle time marks align with the ten-division graticule lines.

e. Push in the POSITION control after adjustment and check.

VERTICAL SYSTEM

⑬ Check/adjust DC balance (Step attenuator balance).

a. Set the VOLTS/DIV switch to the 5 mV position.

b. Position the trace to the horizontal center line.

c. Change the VOLTS/DIV switch to the 10 mV position.

d. Check that the trace is within ±0.05 division of the center horizontal line.

e. Adjust the CH1 (CH2) DC BAL adjustment, RV22 (CH1) or RV122 (CH2), for a trace at the horizontal center line.

f. Repeat the part (a) through (e) until less than ±0.05 division shift is noted when changing the VOLTS/DIV setting.

⑭ Check/adjust vertical position center.

(CH1)

a. Pull out the vertical POSITION control (set the DC OFFSET mode.)

b. Connect a DVM to the DC OFFSET VOLT OUTput terminal.

c. Adjust the vertical POSITION control so that the DVM indicates 0 V.

d. Adjust the position center adjustment RV63 (CH1 only), for a trace at the horizontal center line.

(CH2)

e. Confirm the vertical POSITION control at the midrange.

f. Check the trace is within 1 division.

g. Adjust the position center adjustment RV163 (CH2) for a trace at the horizontal center line.

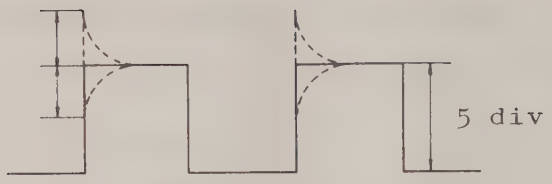
⑮ Check/adjust X1 AC GAIN.

a. Set the TIME/DIV switch to the 1 ms position.

b. Set the VOLTS/DIV switch to the 10 mV position.

c. Set the input coupling switch to DC.

d. Connect the square-wave generator (using 1 kHz output range).



e. Adjust the output amplitude of that generator for 5 division deflection of screen.

f. Check the high-voltage level of pulse is flat.

g. Adjust the X1 AC GAIN RV33 (CH1), RV133 (CH2) adjustment for a flat level.

(16) Check/adjust vertical gain.

a. Set the VOLTS/DIV switch to the 10 mV position and the input coupling switch to DC.

b. Connect the standard amplitude calibrator to the input connector.

c. Set the standard amplitude calibrator for a 50 mVp-p (5 divisions for display) signal.

d. Check for a display of five divisions.

e. Adjust the GAIN adjustment RV62 (CH1), RV162 (CH2) for a display of 5 divisions within 2 %.

f. Check all the VOLTS/DIV switch settings.

(17) Check/adjust input capacity (ATT: ÷ 1).

a. Set the VOLTS/DIV switch to the 10 mV position.

b. Set the input coupling switches to DC.

c. Connect the L-C meter to the input terminals.

d. Check the input capacity for approx. 23 pF.

(18) Check/adjust vertical step response.

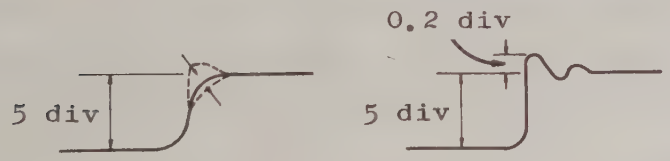
a. Set the VOLTS/DIV switch to the 5 mV position.

b. Set the TIME/DIV switch to the 0.5 μs position.

c. Connect the fast-rise, positive output (50 mV, 1 MHz) of the square-wave generator to the input.
Use a 50 Ω termination and cable.

d. Adjust the square-wave generator output for a 5 divisions display.

e. CH1 — Adjust CV366 so that a square wave is flat. Then, adjust CV337 for overshoot of +0.2 div.
CH2 — Adjust CV161 for overshoot of +0.2 div.



(19) Check/adjust attenuation compensation.
(ATT: ÷ 10, ÷ 100)

a. Set the input coupling switch to DC.

b. Connect the square-wave generator to the CH1 (CH2) input terminal check for a square wave that is flat (flat top) under the following settings.

ATT	VOLTS/DIV	Square-wave generator output
÷ 10	0.1 V	0.5 V
÷ 100	1 V	5 V

c. Adjust the trimmer capacitors for a square wave that is flat (flat top) under the following settings.

ATT	VOLTS/DIV	Square-wave generator output	Adjust CH1 (CH2)
÷ 10	0.1 V	0.5 V	CV4 (CV104)
÷ 100	1 V	5 V	CV7 (CV107)

(20) Check/adjust input capacity (ATT: ÷ 10, ÷ 100).

a. Connect the L-C meter to the input connector.

b. Check the input capacity for approximately 23 pF.

c. Adjust the trimmer capacitors for a 2 pF input capacity under the following settings.

ATT	VOLTS/DIV	Adjust CH1 (CH2)
÷ 1	5 mV	-
÷ 10	0.1 V	CV3 (CV103)
÷ 100	1 V	CV6 (CV106)

(21) X-Y operation

21-1 Check/adjust X gain.

a. Set the TIME/DIV switch to X-Y, the input coupling switch of CH1 to AC, the input coupling switch of CH2 to GND.

b. Set the VOLTS/DIV switch to the 10 mV position.

c. Connect the standard amplitude calibrator to the CH1 input connector.

d. Set the standard amplitude calibrator for 50 mV.

e. Check for a display of five divisions.

f. Adjust the X GAIN adjustment RV550 for a display of five divisions within 6 %.

21-2 Check/adjust X position center.

a. Set the TIME/DIV switch to the X-Y position, and the horizontal POSITION control to the midposition, the input coupling switch of CH1 to GND.

b. Check to see that the round spot is near the center graticule and is within $\pm$0.2 division against horizontal line.

c. Adjust the X CENT adjustment RV85 to the position spot at the center.

TRIGGER SYSTEM

(22) Check/adjust TRIG CENT.

a. Set the TRIG SOURCE switch to INT, the INT TRIG switch to CH1, the TRIG SLOPE knob push in, the VOLTS/DIV switch to 50 mV, the TIME/DIV switch to 10 μs.

b. Connect the since-wave generator to the input connector for a 0.5 div (50 kHz).

c. Set the TRIG LEVEL knob to the midposition.

d. Adjust RV420 so that synchronization is effected on the waveform, 0.5 div on the screen.

e. Next, set the TRIG SLOPE to - (pulled out state) and insure that the waveform is triggered. After confirmation, leave the TRIG SLOPE in depressed state. Readjust when stepped out.

f. Set the TRIG COUPLING to DC and repeat the step e. Adjust RV85 (PEF-620) if necessary.

(23) Check/adjust CH2 TRIG BAL.

a. Set the VOLTS/DIV switch to 50 mV (CH1 and CH2), the TIME/DIV switch to 10 μs, the TRIG SOURCE switch to INT, the INT TRIG switch to $\frac{\text{VERT}}{\text{MODE}}$, the V.MODE switch to ALT, and the CH1 POSITION knob to the midposition.

b. Connect the sine-wave generator to the input connectors (CH1 and CH2) for a 5 div (50 kHz).

c. Adjust CH2 POSITION control so that CH2 waveform comes to CH1.

d. Next, adjust RV185 so that both waveforms (CH1 and CH2) coincides.

CALIBRATOR

(24) Check/adjust CAL terminal (0.5 Vp-p, 1 kHz).

a. Connect the CAL terminal to the digital multi-meter, short the terminal 1 to 3 of the connector (P1206).

b. Check for the CAL output of 0.5 V, within 1 %.

c. Adjust the 0.5 V adjustment RV1201 for the CAL output of 0.495 to 0.505 V.

DIGITAL STORAGE SECTION

(25) Checking of the supply voltage (circuit board PEF-761).

a. Connect the DVM between +5 (J1702-1) and ground and check if the voltage is in the following range.

: +4.8 to +5.2 V

b. Connect the DVM between +12 (J1702-5) and ground and check if the voltage is in the following range.

: +11.7 to +12.3 V

c. Connect the DVM between -12 (J1702-7) and ground and check if the voltage is in the following range.

: -12.3 to -11.7 V

(26) Checking AD reference voltage (circuit board PEF-758).

a. Connect the DVM between test point TP1 of PEF-758 and ground. Adjust RV1301 if the reading is not within +4.5 V ±10 mV.

(27) Checking of the starting point and length of the trace.

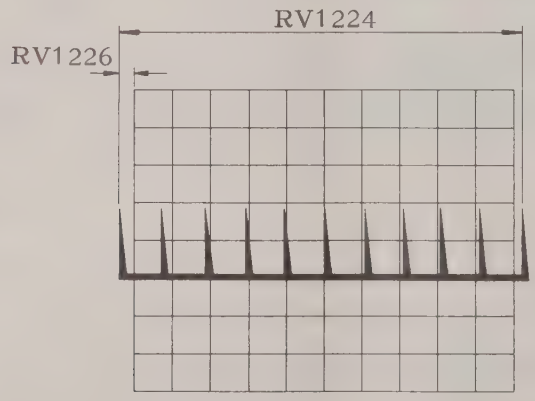
a. Set the time mark generator for 1 ms time marks.

b. Set the TIME/DIV switch to 1 ms.

c. Check that the trace starting point shifts within ±0.3 div when NON STORE and NORM are switched over alternately. Adjust RV1226, if necessary.

d. Check that the time marks align with the graticule lines over the middle eight divisions, within 3 %. (Operation mode: NORM)

e. Adjust the 1 ms/div adjustment RV1224 so that the time marks coincide with the middle eight graticule lines.



(28) Checking of the DA output circuit (Y offset and gain).

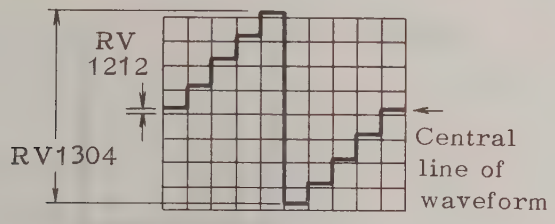
a. Set the PRE TRIG switch to the 8 div.

b. Push the HOLD KEY and PLOT KEY simultaneously

c. Check that the center line of the waveform amplitude meets with the center horizontal line.

d. Adjust RV1212 (circuit board PEF-759 (28a)) so that the difference of two lines is within ±0.05 div, if necessary.

e. Check that the waveform amplitude occupies 8 div.
Adjust RV1304 (circuit board PEF-758 (28b)), if necessary so that the deviation becomes within 1 %.



(29) Checking the AD converter section (circuit board PEF-759).

a. Setting of controls

OPERATION MODE	:	NON STORE
VERTICAL MODE	:	CH1/CH2
TIME/DIV	:	0.1 ms/div
VOLTS/DIV	:	10 mV/div
INPUT	:	GND
V. POSITION	:	Mid-position

b. Checking of the CH1, CH2 offset.
Check that the trace is not slipped off from the horizontal center line of the screen when NON STORE and NORM are switched over alternately.
If necessary, adjust RV1029 (CH1 (29a)), RV1113 (CH2 (29b)) so that the trace is on the center line.

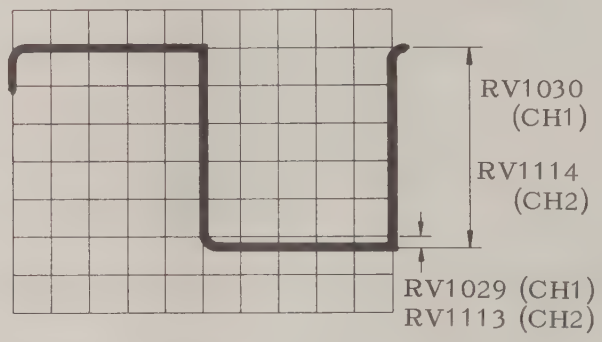
c. Check/adjust CH1 gain
When the INPUT is set to DC and CAL square wave is applied for 5 div, check that the screen display occupies 5 div. If necessary, adjust RV1030 (29c) so that the screen display is within 5 ±0.05 div. (Recheck the offset of step (b.). If necessary, repeat (b.) and (c.)

alternately and decide the adequate value.)

d. Check/adjust CH2 gain

When CAL square wave is supplied, check that the screen display occupies 5 div. If necessary, adjust RV1114 (29d) so that the screen display is within 5 ±0.05 div.

(Recheck the offset of step (b.). If necessary, repeat (b.) and (d.) alternately and decide the adequate value.)



(30) Checking of the recorder output (circuit board PEF-760).

a. Setting of controls

OPERATION MODE	:	NORM
VERTICAL MODE	:	ALT or CHOP
TRIG MODE	:	AUTO
INPUT	:	GND
V. POSITION (CH1, CH2)	:	Clockwise to the full
PLOT MODE	:	Y-T (▬ pushed in)
PLOT OUT TIME	:	10 s/div

b. Set the OPERATION MODE to HOLD.

c. Connect the DVM between the PLOT OUTPUT BNC connector of CH1 (CH2) on the rear panel and ground.

d. Push the PLOT KEY.

e. 10 seconds later, adjust RV1409 (30a) (RV1410 (30b)) if the terminal voltage is not 10.03 V ±20 mV.

5. CIRCUIT DESCRIPTION

- Introduction -

This section contains a description of the circuitry used in VC-6020. The block diagram (p.67 to 69) shows the overall relationship between all of the circuits. Complete schematics of each circuit are also given in section Schematic diagrams(p.71 to 107). Refer to these diagrams throughout the following circuit description for electrical values and relationships.

CHANNELS 1 and 2 VERTICAL PREAMP

Input signals for vertical deflection on the CRT can be connected to the "CH1 OR X" and (or "CH2 OR Y" input connectors. In the X-Y mode of operation, CH1 input signal provides the horizontal (X-axis) deflection and CH2 input signal provides the vertical (Y-axis) deflection.
The Channel 1 and 2 Vertical Preamp circuits provide control of input coupling, vertical deflection factor, DC balance, vertical position and vertical gain. They also contain a stage to provide a sample of the input signal to the Trigger Preamp circuit for internal triggering from the Channel 1 and (or) Channel 2 signal only.

VERTICAL SWITCHING CIRCUIT

The vertical switching circuit changes the vertical signal path in the NON STORE mode or STORAGE mode.
In the case of NON STORE mode, whether the CH1 or CH2 or both Vertical Preamp output signals are connected to the Vertical Output Amplifier circuit. In the ALT and CHOP mode, both channels are alternately displayed on a shared time basis.
In the case of STORAGE mode, the path from the Vertical Preamp circuit to the Vertical Output Amplifier is cut off. Then whether the CH1 or CH2 or ADD signals of them are connected to the Interface of the first stage of the AD Converting Circuit. When the MODE select switch is set to ALT, CHOP, CH1 and CH2 pass through the routes independently in parallel, where CH1 is fed from CH1 Preamp and CH2 is fed from the Vertical Amplifier.

The circuit also supplies the signal composed in the Display Memory section by DA converting the storaged waveform data as an input signal to the Vertical Output Amplifier in the case of STORAGE mode.

VERTICAL OUTPUT AMPLIFIER

The Vertical Output Amplifier circuit provides the final amplification for the signal before it is applied to the vertical deflection plates of the CRT.

TRIGGER PREAMP

The Trigger Preamp circuit amplifies the internal trigger signal to the level necessary to drive the Trigger Generator circuit.
Input signal for the Trigger Preamp circuit is obtained by sampling the signal applied to Channel 1 or the composite vertical signal from the Vertical switching circuit.
This circuit also provides a signal to the Horizontal Amplifier for X-Y mode operation.

TRIGGER GENERATOR

The Trigger Generator circuit produces trigger pulses to start the Sweep Generator circuit. The trigger pulses are derived either from the internal trigger signal from the vertical deflection system, an external signal connected to the EXT TRIG INput connector or a sample of the line voltage applied to the instrument.
Controls are provided in this circuit to select trigger level, slope, source and coupling.
The Trigger MODE switch determines the operating mode for the trigger circuit. In the NORM Trig position, a sweep is produced only when a trigger pulse is received from the Trigger Generator circuit. Operation in the AUTO Trig mode is the same mode as NORM Trig mode, except that a free-running trace is displayed when a trigger pulse is not present or when the amplitude of the trigger signal is not adequate.

SWEEP GENERATOR

The Sweep Generator circuit produces a sawtooth voltage which is amplified by the Horizontal Amplifier circuit to provide horizontal deflection on the CRT. This sawtooth voltage is generated on command (trigger pulse) from the Trigger Generator circuit.

The Sweep Generator circuit also produces an unblanking gate to unblank the CRT during sweep time.

HORIZONTAL SWITCHING CIRCUIT

The horizontal switching circuit selects the signal to be applied to the horizontal deflection plates of the CRT.

In the case of NON STORE mode, the sawtooth waveform signal generated by the Sweep Generator circuit is selected as the horizontal deflection signal if the TIME/DIV switch is not set to X-Y. If the switch is set to X-Y, X signal which is obtained from the CH1 Vertical Preamp through the Trigger Preamp circuit is selected.

In the case of STORAGE mode, the signal composed by the Display Memory circuit is selected. When the TIME/DIV switch is not set to X-Y, the digital sweep signal which is composed by synchronizing with the read-out timing of the Display Memory is selected.

When the TIME/DIV switch is set to X-Y in the STORAGE mode, the CRT display is disappeared by the microcomputer.

HORIZONTAL AMPLIFIER

The Horizontal Amplifier circuit provides the output signal to the CRT horizontal deflection plates.

CALIBRATOR

The Calibrator circuit produces a square-wave output with accurate amplitude and frequency. This output is available as a square-wave voltage at the CAL 0.5 V (1 kHz) connector.

Z AXIS AMPLIFIER

The Z-Axis Amplifier circuit controls the CRT intensity level from several inputs. The effect of these input signals is to either increase or decrease the trace intensity, or to completely blank portions of the display.

CRT CIRCUIT

The CRT Circuit provides the high-voltage and control circuits necessary for operation of the cathode-ray tube (CRT).

POWER SUPPLY

The low-voltage Power Supply circuit is composed of Power supply 1 which supplies power to oscilloscope section, Power supply 2 which supplies power to digital circuits.
Power supply 1 supplies four regulated supplies and one unregulated supply while Power supply 2 supplies three regulated supply.
The Power Input stage is provided with a Voltage Selector Assembly. This selector allows selection of the nominal operating voltage and regulating range for the instrument.

DIGITAL STORAGE circuit

A STORAGE PREAMP circuit (PEF-759)

Fig. 5-1 is a block diagram of the circuit ◈10◈ .
The signal from the real-time oscilloscope and that from the digital storage oscilloscope are switched by the transistor switch consisting of TR1201 through TR1204. The signal from the real oscilloscope is the vertical signal from the preamp ◈2◈ . The signal from the digital storage oscilloscope is one that is converted into an analog signal fed from the memory of ◈11◈ .
In the storage mode, the CH1 signal is routed to the DA converter through the CH1 STORAGE PREAMP, the ANALOG SW and the VOLTAGE LIMITER. The ANALOG SW switches the CH1 INPUT signal and the CH1 POSITION signal.

In the NORM STORAGE mode, the CH1 INPUT signal is selected and converted into a digital signal.

In the HOLD mode, the CH1 POSITION signal is selected and the CH1 POSITION voltage is converted into a digital signal.

The built-in microcomputer reads the voltage of the position control during the HOLD mode and compares it with the previous value. When the position is changed, the changed data is added to or subtracted from the data memory for display by the microcomputer. Thus, the displayed waveform moves upward or downward in accordance with the position control.

The ANALOG SW is switched by the microcomputer.

B AD converter, microcomputer, and peripheral circuits

Fig. 5-2 is the peripheral circuits of the microcomputer. The data transfers described below are made by the LSI for the Direct Memory Access LSI (LH0083A).

① AD converter ——→ ACQ memory
② ACQ memory ——→ Microcomputer memory
③ Microcomputer memory ——→ DISP memory

The interval of the write-in time from the AD converter to the ACQ memory must be controlled in accordance with a time range. The transfer interval of the DMA is controlled by applying a wait signal to the LSI for the DMA control from the Counter/Timer Controller (3D, 4D, LH0082A).

1) Functions of the microcomputer

1. Reading of the operation mode and the state of switches, and lighting of LED's
2. Control of LSI's (DMA, CTC, etc.)
3. Plot output
4. Reading of the information on the switches (TIME/DIV, V. MODE, etc.) on the front panel
5. Transfer of the GPIB data (control of the LSI for the GPIB)
6. Reading of the V position during the HOLD mode and shifting of the displayed waveform

2) Operations of the microcomputer

i) NON STORE mode

The microcomputer allows the transistor switch consisting of TR1201 through TR1204 to switch the signal from ◇2◇ (IC1201 ⑫ : "L") and becomes in the HALT mode. The microcomputer remains in the HALT mode until the other mode switches (NORM, HOLD) are pressed.

ii) NORM mode

The microcomputer reads the information on the switches (TIME/DIV, PRE TRIG, etc.) on the front panel and performs the initial setting to allow the CTC LSI to control the sampling speed and the pre-trigger. Then, it performs the initial setting of the DMA LSI to transfer the data from the AD converter to the ACQ memory. (Fig. 5-2 ①)

When the data transfer is completed after the trigger pulse has reached, the microcomputer changes the setting values of the DMA LSI and allows the DMA LSI to transfer the data from the ACQ memory to the RAM of the microcomputer. (Fig. 5-2 ②)

Further, the microcomputer allows the DMA LSI to transfer the data from the RAM of the microcomputer to the DISP memory at the timing of the blanking of the CRT. (Fig. 5-2 ③) The blanking is released after the data transfer has been completed. The microcomputer switches the transistor switch (TR1201-1204) in Fig. 5-1 so that the signal from the DA converter is selected. (IC1201 ⑫ : "H")

Then the microcomputer reads the information on the switches on the front panel and controls the LSI's so that the data transfers ①, ②, ③ are repeated.

iii) HOLD mode

When the HOLD switch is pressed, the microcomputer stops the NORM mode operation and holds the waveform displayed on the CRT. Then, it allows the analog switch (IC1209) in Fig. 5-1 to select the V position signal and reads the value of the V position converted into a digital signal.

When the converted value changes, the microcomputer adds the value corresponding to the change to the waveform data which the microcomputer holds in its own RAM.

This waveform data is transferred to the DISP memory by the DAM LSI. Thus, the HOLD waveform is moved upward or downward by the V position control.

iv) SINGLE mode

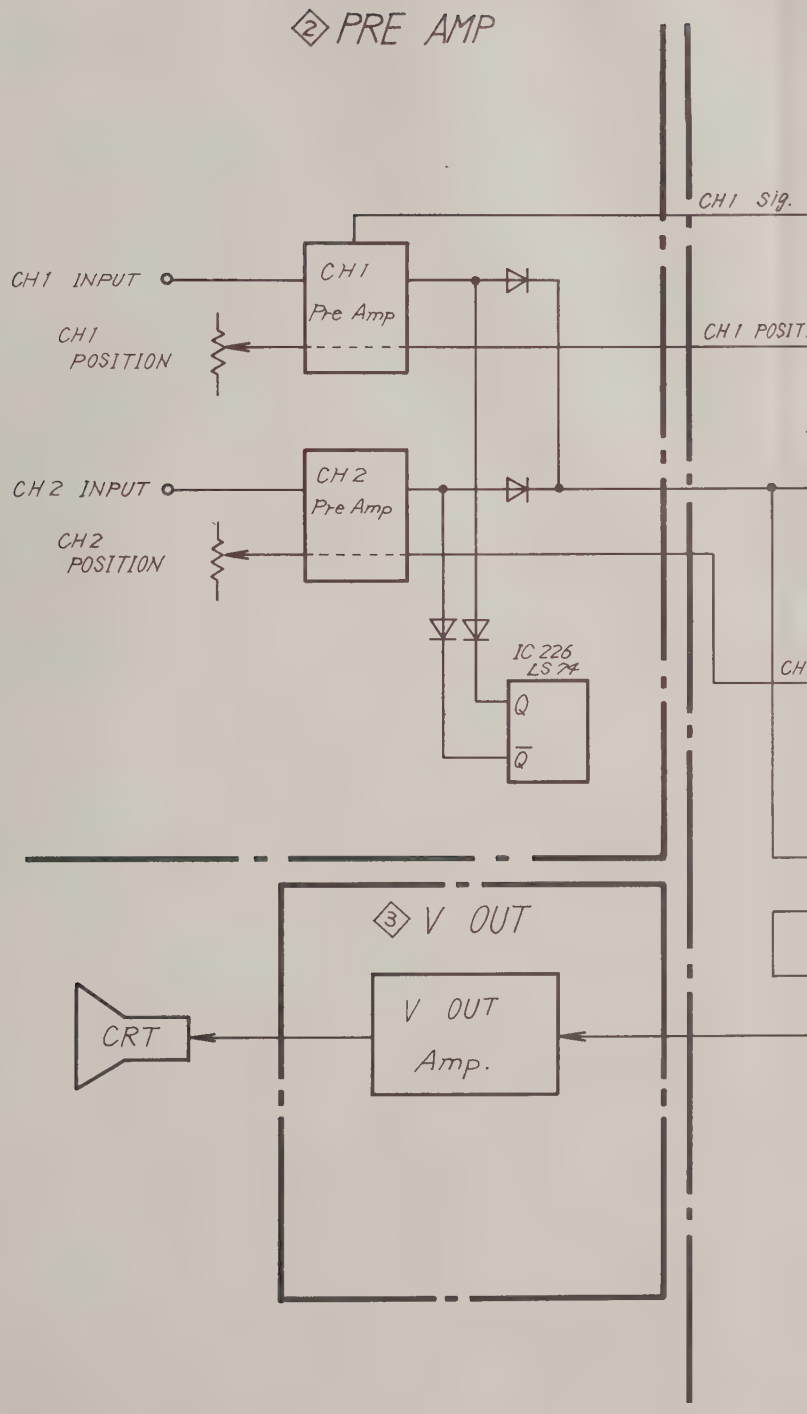
When the SINGLE switch is pressed in the HOLD mode, the microcomputer performs the NORM mode operation once and returns to the HOLD mode operation.

v) PLOT mode

When the PLOT switch is pressed in the HOLD mode, the waveform data (or sawtooth) are latched to the LATCH circuit preceding to the DA converter for the PLOT OUT in accordance with the PLOT MODE and the PLOT OUT TIME switches on the rear panel.

vi) ROLL mode

In the ROLL mode, the microcomputer reads several waveform data which are converted into digital signals and writes them at the end of the waveform data of its own RAM. The data stored in the RAM are transferred to the DISP memory by the DMA LSI. The data which are converted into digital signals are written at the end of waveforms in succession. Since the DISP memory is thus rewritten, the waveforms displayed on the CRT are rolled smoothly from right to left.


② PRE AMP
CH1 Sig.
CH1 INPUT
CH1
Pre Amp
CH1
POSITION
CH1 POSIT
CH2 INPUT
CH2
Pre Amp
CH2
POSITION
IC 226
LS 74
Q
Q̄
CH
③ V OUT
CRT
V OUT
Amp.

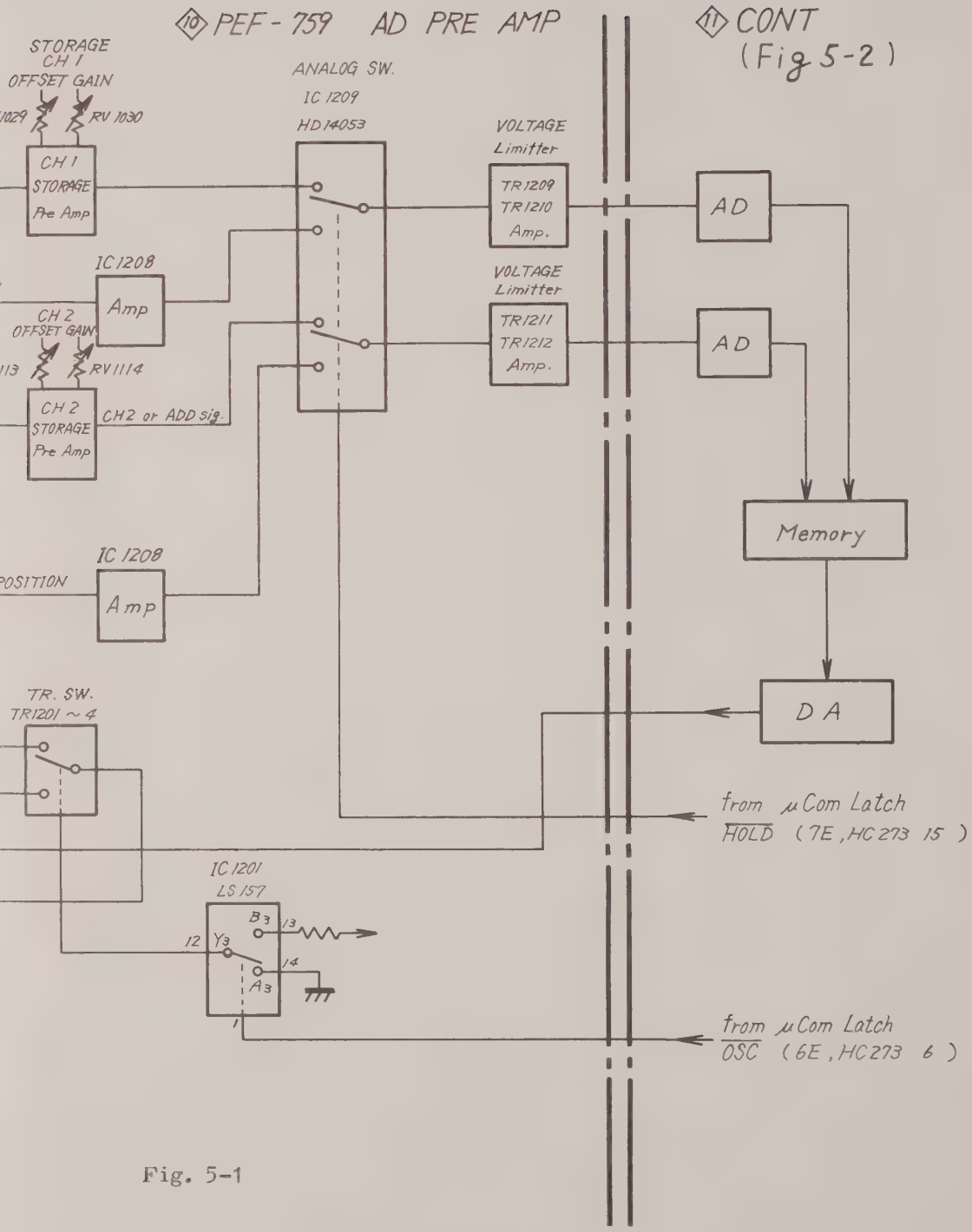
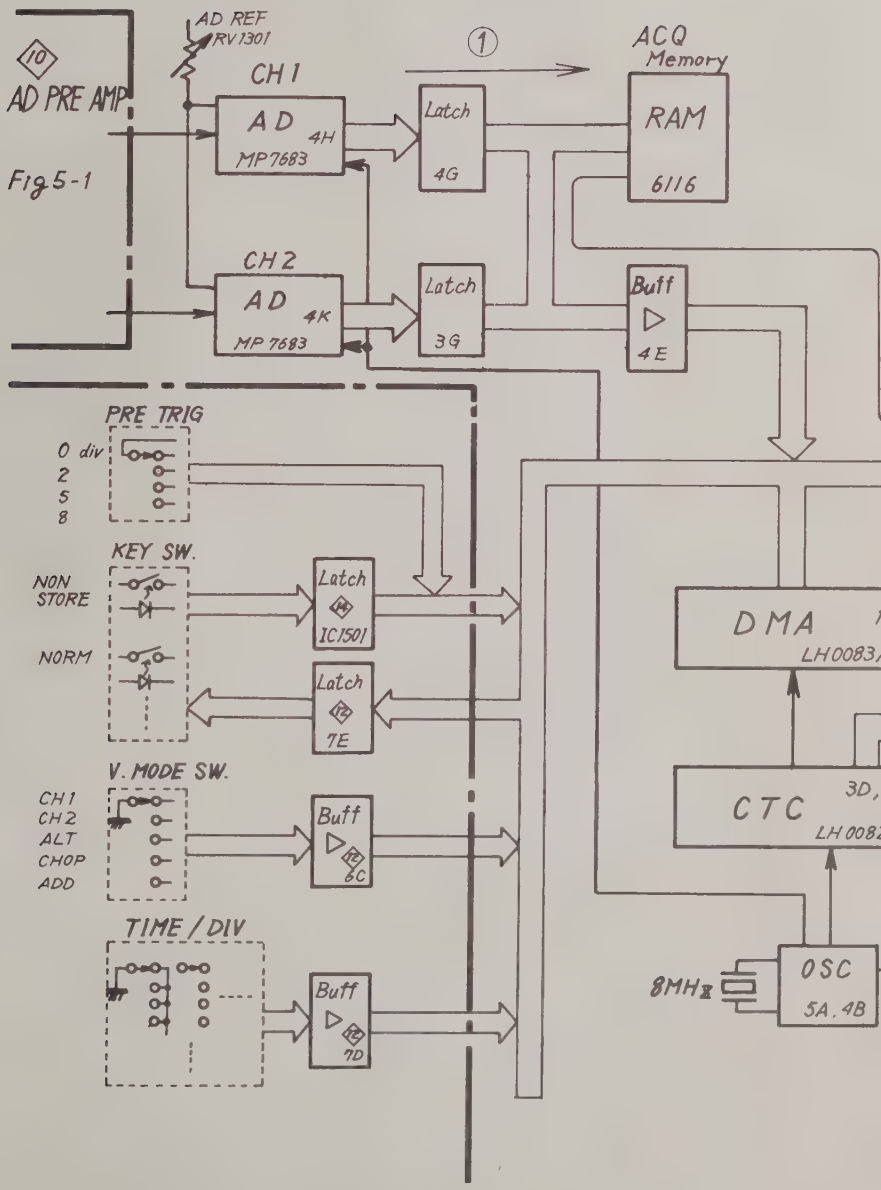

⑩ PEF-759 AD PRE AMP
⑪ CONT
(Fig 5-2)
STORAGE
CH 1
OFFSET GAIN
RV 1030
CH 1
STORAGE
Pre Amp
ANALOG SW.
IC 1209
HD14053
VOLTAGE
Limitter
TR1209
TR1210
Amp.
AD
IC1208
Amp
CH 2
OFFSET GAIN
RV1114
CH 2
STORAGE
Pre Amp
CH2 or ADD sig.
VOLTAGE
Limitter
TR1211
TR1212
Amp.
AD
Memory
IC 1208
Amp
TR. SW.
TR1201 ~ 4
D A
from μCom Latch
HOLD (7E, HC273 15)
IC1201
LS157
B3
Y3
A3
12
13
14
1
from μCom Latch
OSC (6E, HC273 6)

Fig. 5-1


⟨10⟩
AD PRE AMP
Fig 5-1
AD REF
RV1301
CH 1
AD 4H
MP7683
CH 2
AD 4K
MP7683
①
ACQ
Memory
Latch
4G
Latch
3G
RAM
6116
Buff
4E
PRE TRIG
0 div
2
5
8
KEY SW.
NON
STORE
NORM
Latch
IC1501
Latch
7E
V. MODE SW.
CH 1
CH 2
ALT
CHOP
ADD
Buff
8C
TIME / DIV
Buff
7D
DMA
LH0083
CTC
LH008
3D,
8MHz
OSC
5A. 4B

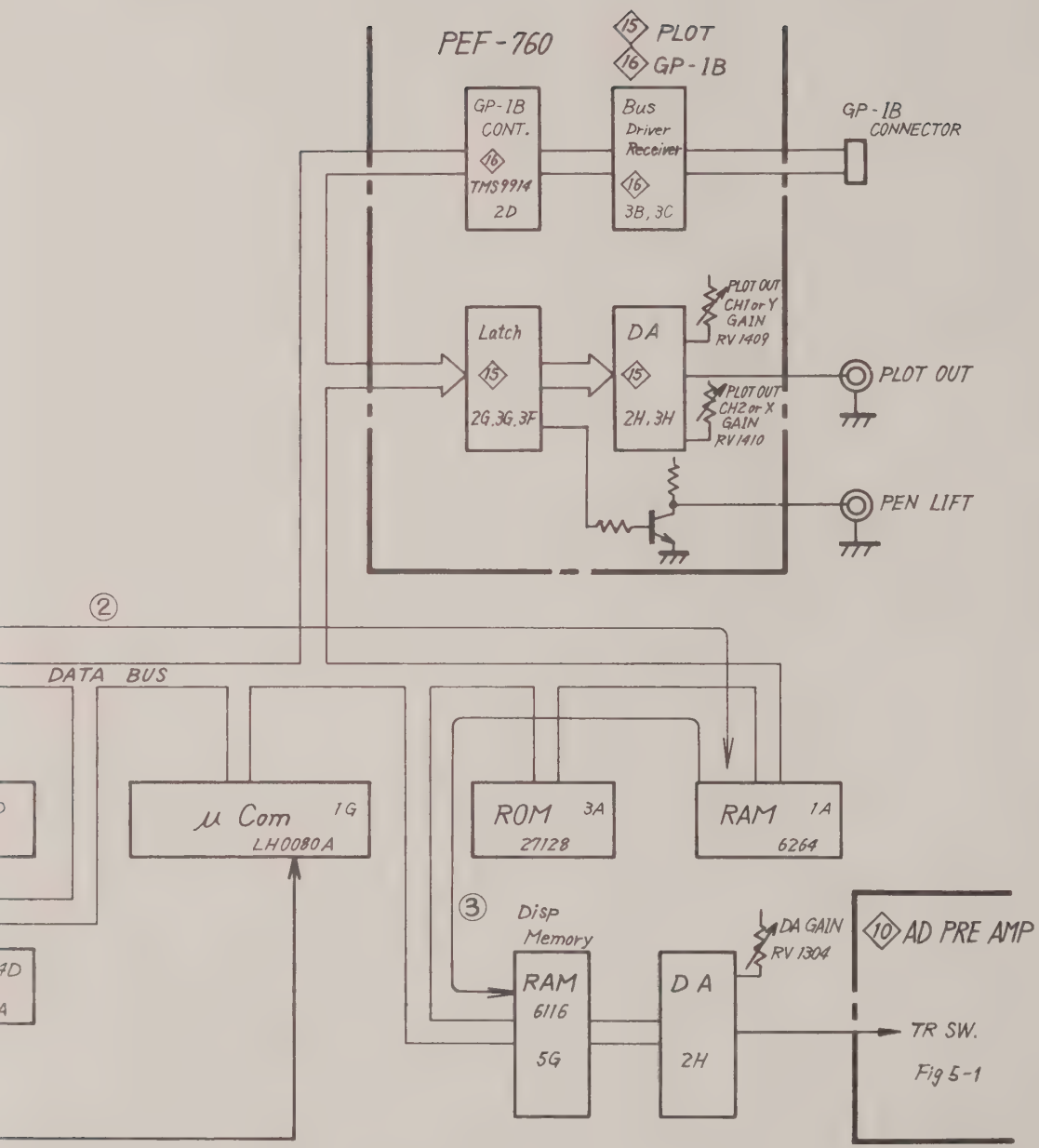
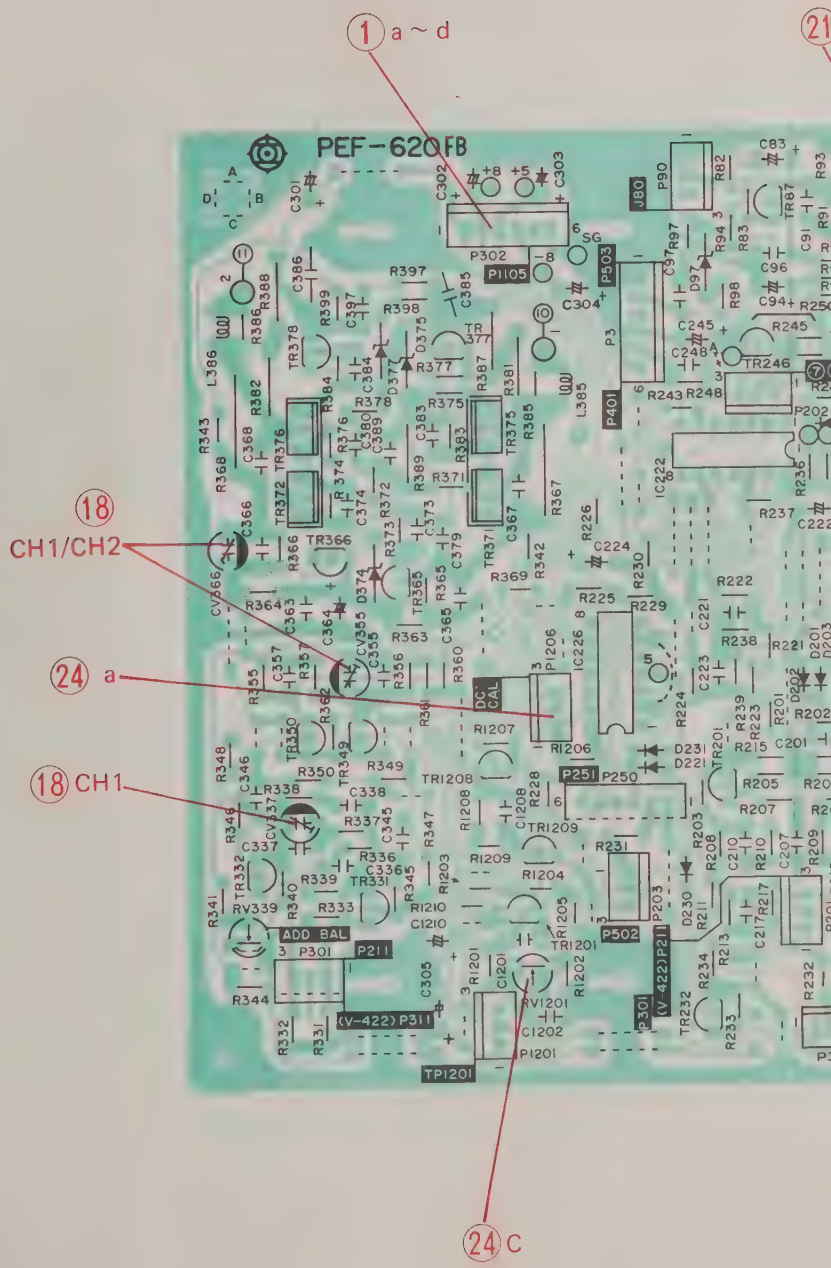
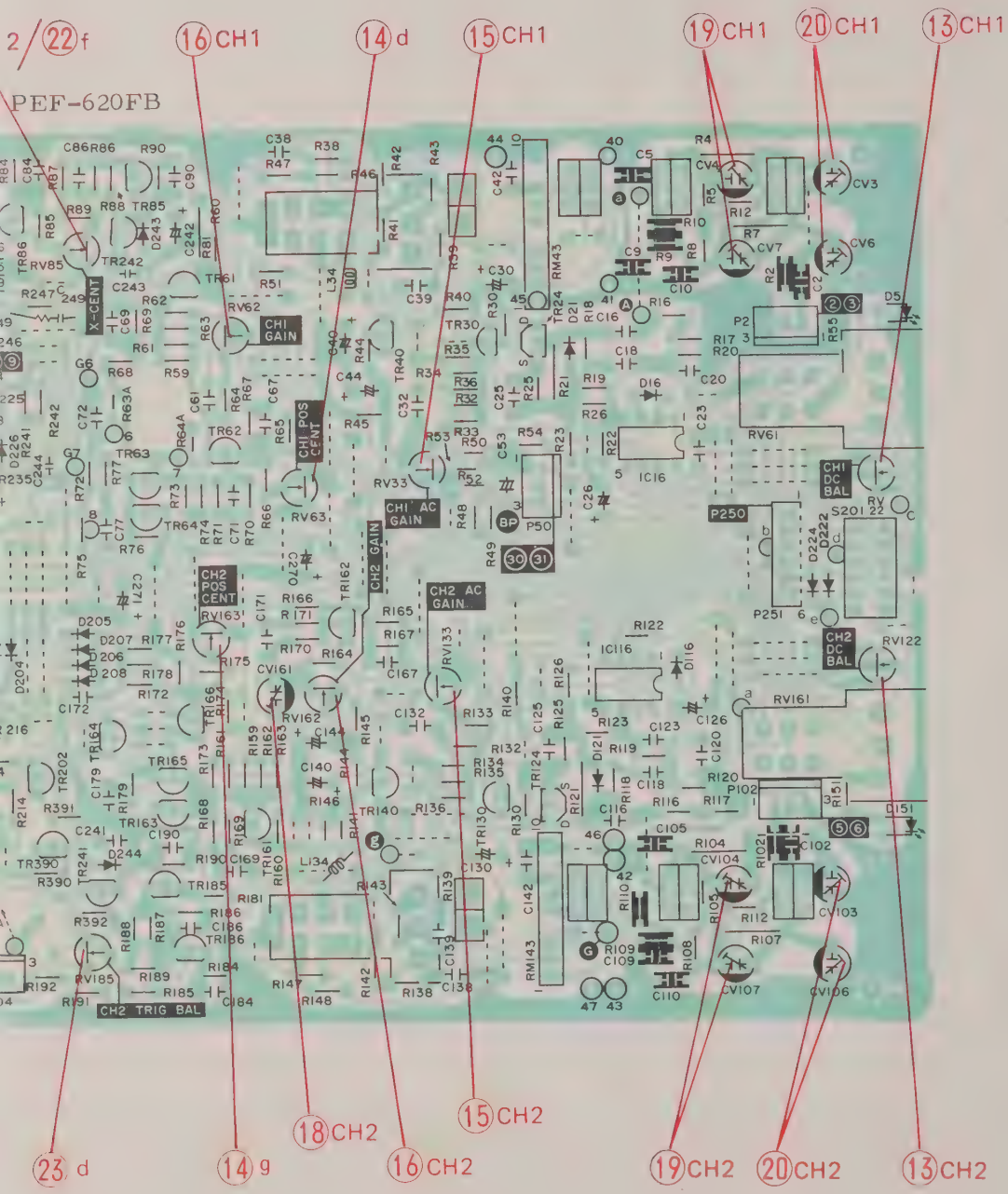
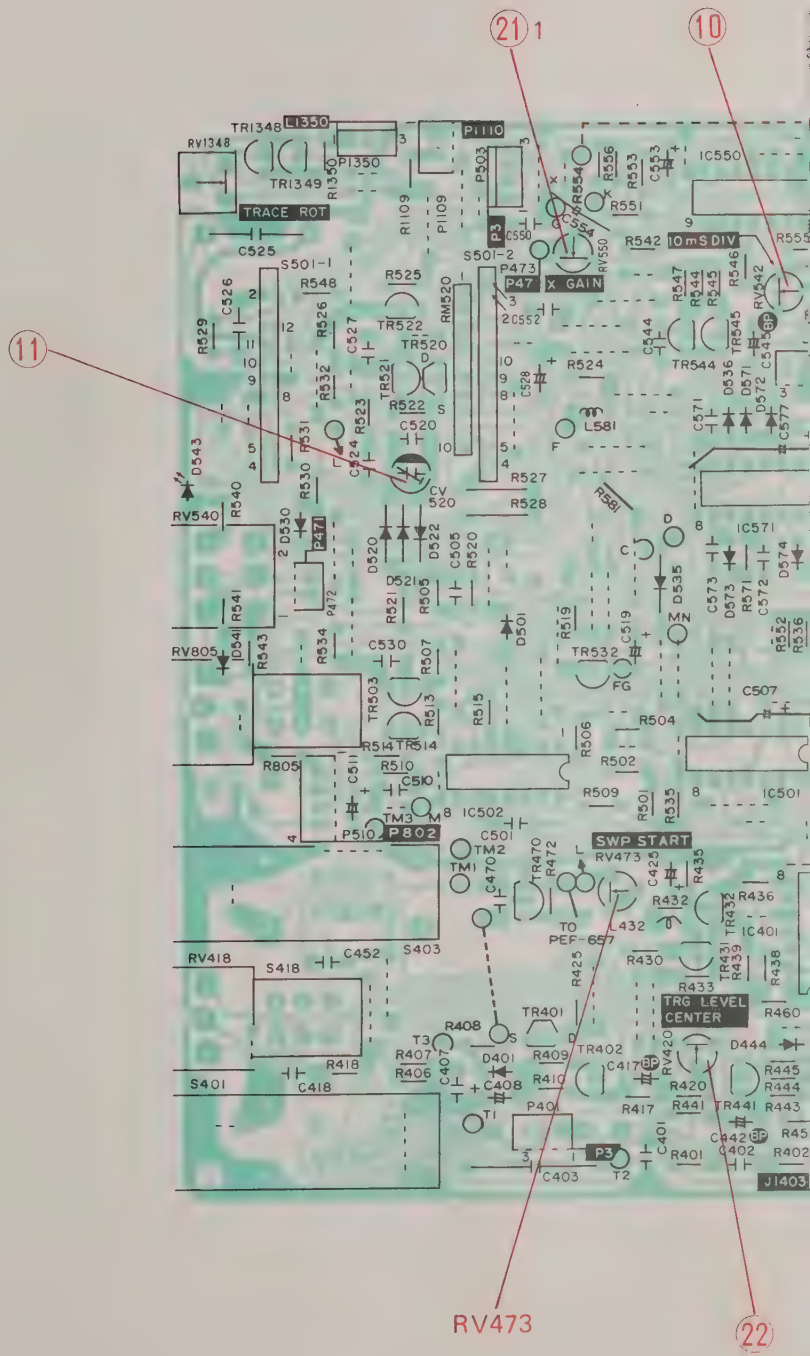

PEF-760
15 PLOT
16 GP-1B
GP-1B CONT.
16
TMS9914
2D
Bus Driver Receiver
16
3B, 3C
GP-1B CONNECTOR
Latch
15
2G, 3G, 3F
DA
15
2H, 3H
PLOT OUT CH1 or Y GAIN RV1409
PLOT OUT CH2 or X GAIN RV1410
PLOT OUT
PEN LIFT
②
DATA BUS
μ Com 1G
LH0080A
ROM 3A
27128
RAM 1A
6264
③ Disp Memory
RAM
6116
5G
D A
2H
DA GAIN RV1304
10 AD PRE AMP
TR SW.
Fig 5-1

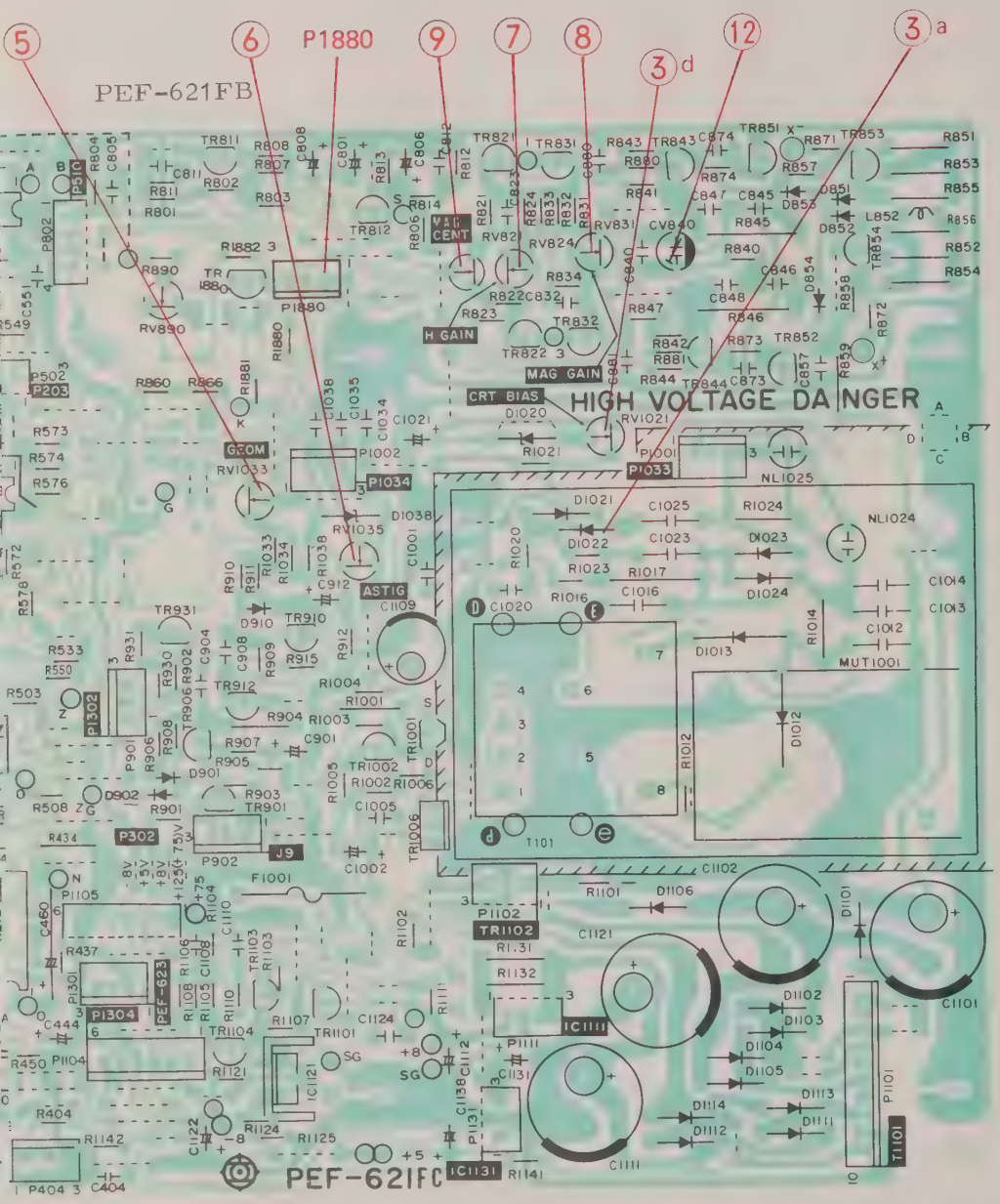
Fig. 5-2

6. ELECTRICAL PARTS ARRANGEMENT

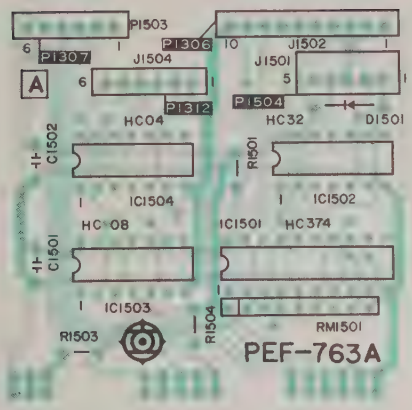



PEF-620FB
2/22 f
16 CH1
14 d
15 CH1
19 CH1
20 CH1
13 CH1
X-CENT
CH1 GAIN
CH1 POS CENT
CH1 AC GAIN
CH2 GAIN
CH2 POS CENT
CH2 AC GAIN
CH1 DC BAL
CH2 DC BAL
CH2 TRIG BAL
P250
P251
P50
P102
P2
S201
18 CH2
15 CH2
23 d
14 g
16 CH2
19 CH2
20 CH2
13 CH2


21
1
10
11
RV473
22
TRACE ROT
10mS DIV
X GAIN
SWP START
TRG LEVEL CENTER
TO PEF-657


PEF-621FB
5
6
P1880
9
7
8
3 d
12
3 a
HIGH VOLTAGE DANGER
H GAIN
MAG GAIN
CRT BIAS
GEOM
ASTIG
MAG CENT
P1880
P1034
P1033
P1002
P1001
P1102
P1111
P1105
P1304
P1301
P1302
P302
P303
P203
P902
J9
T1101
T1102
IC1111
IC1131
PEF-623
PEF-621FC
NL1025
NL1024
MUT1001
F1001
+8V
+5V
-8V
+12V
75V

PEF-763A



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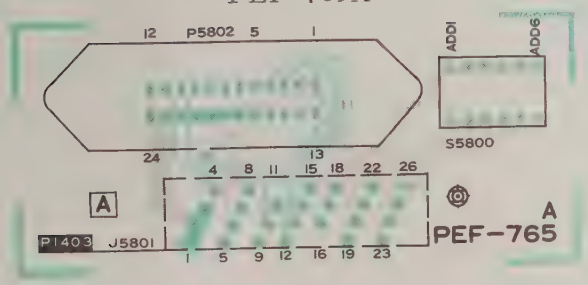

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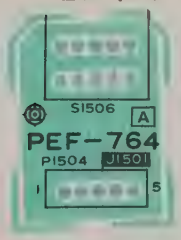

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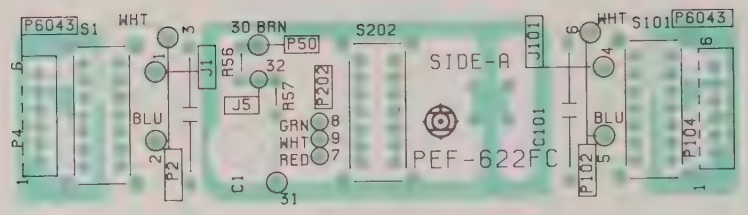
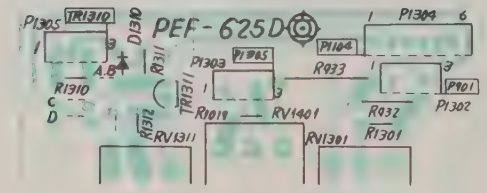
PEF-622FB



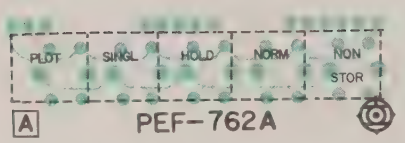
PEF-623FA

623FB SIDE A

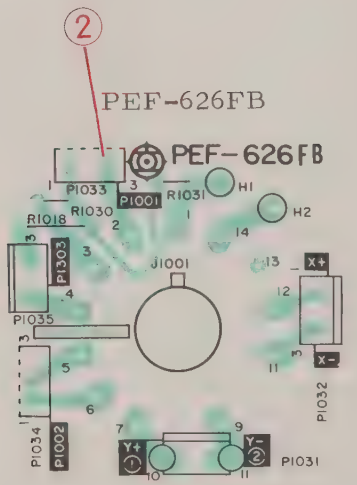
PEF-625D

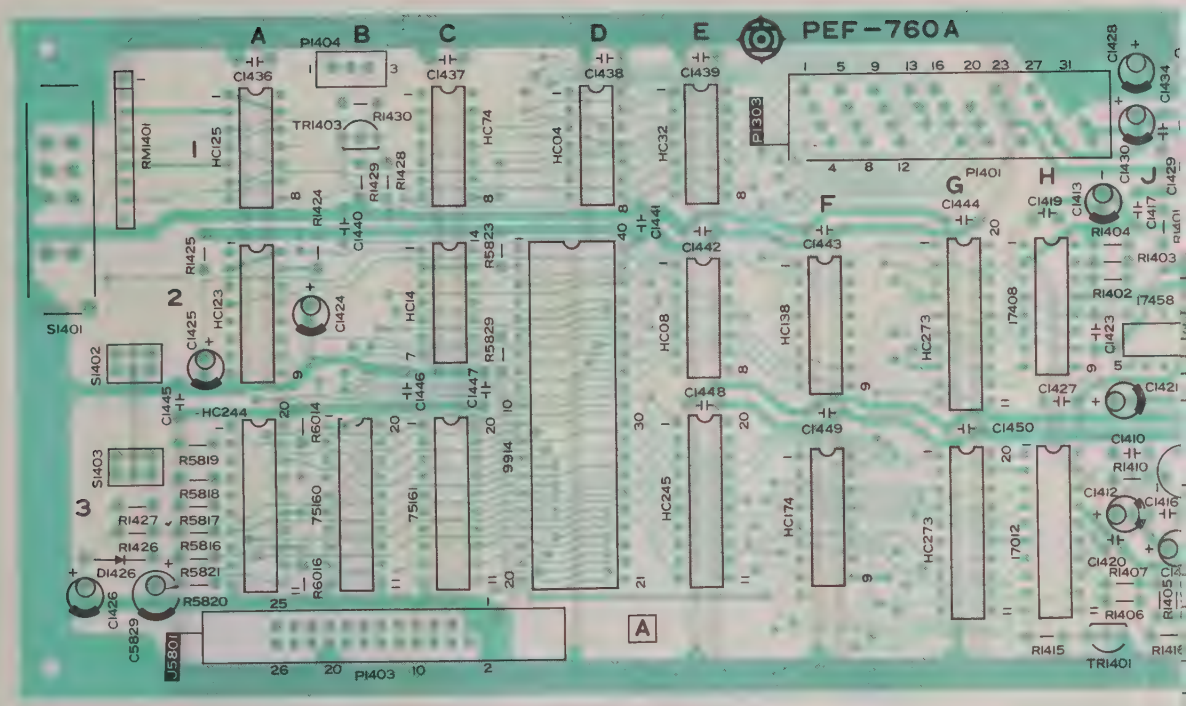


PEF-762A

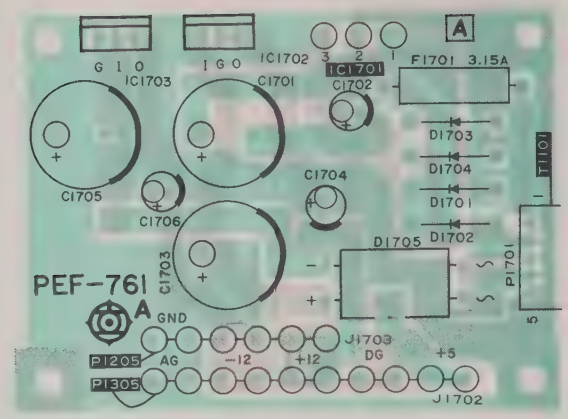


PEF-626FB

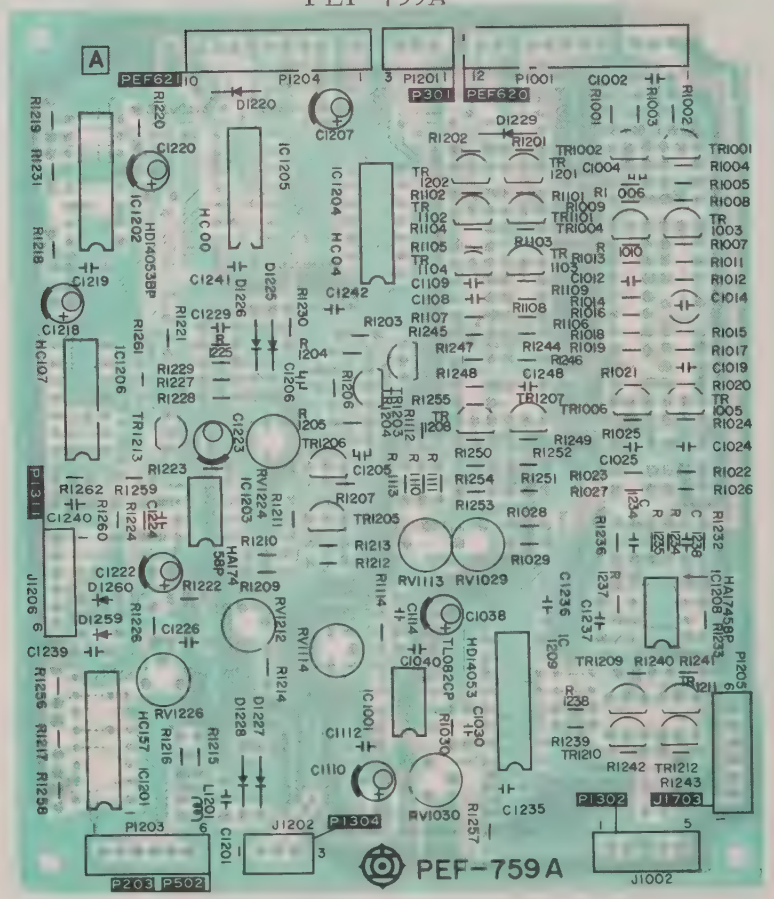



PEF-760A
A
B
C
D
E
F
G
H
J
P1404
P1303
P1401
P1403
J5801
S1401
S1402
S1403
RM1401
TRI403
TRI401
HC125
HC123
HC244
HC14
HC74
HC04
HC32
HC08
HC138
HC273
HC245
HC174
75161
75160
9914
17408
17458
17012
C1436
C1437
C1438
C1439
C1440
C1441
C1442
C1443
C1444
C1445
C1446
C1447
C1448
C1449
C1450
C1419
C1424
C1425
C1426
C1427
C1428
C1429
C1430
C1434
C5829
D1426
R1427
R1426
R5819
R5818
R5817
R5816
R5821
R5820
R6014
R6016
R1424
R1425
R1428
R1429
R1430
R5823
R5829
R1404
R1403
R1402
R1410
R1407
R1406
R1415
R1405
R1416
C1423
C1421
C1410
C1412
C1416
C1420
C1413
C1417

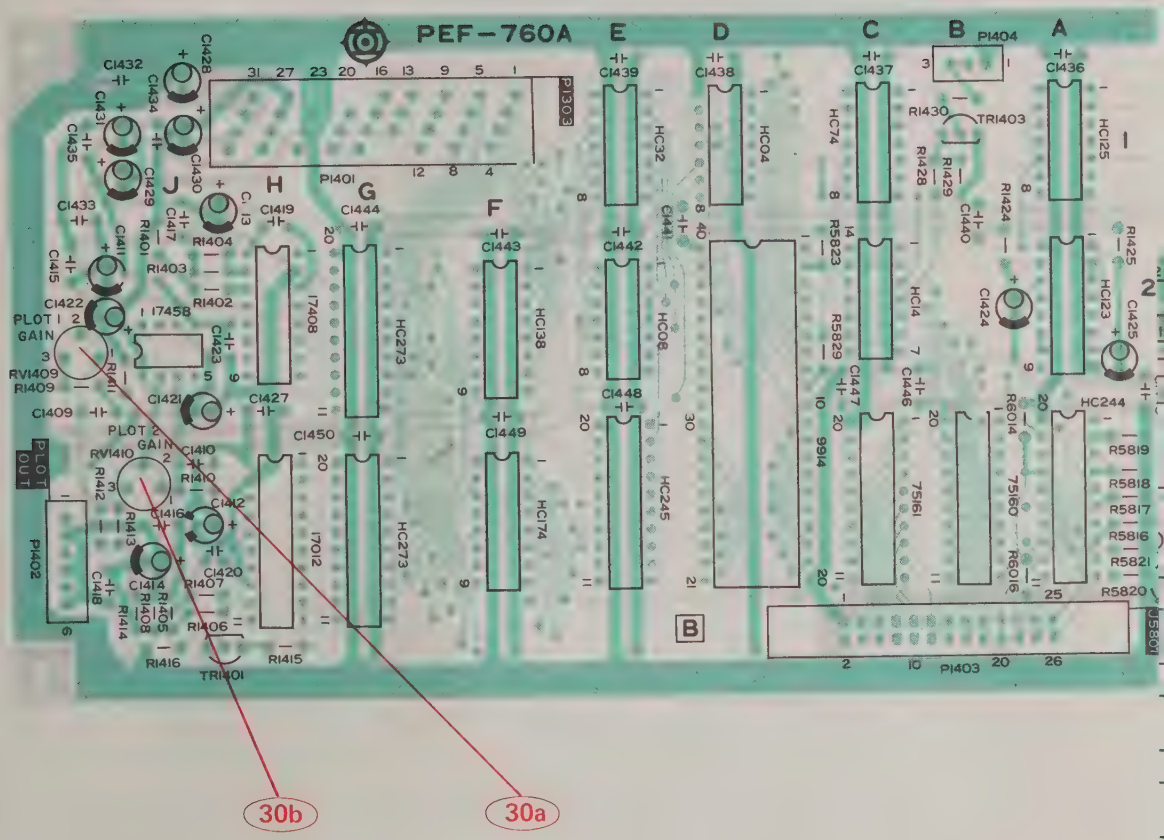
PEF-761A



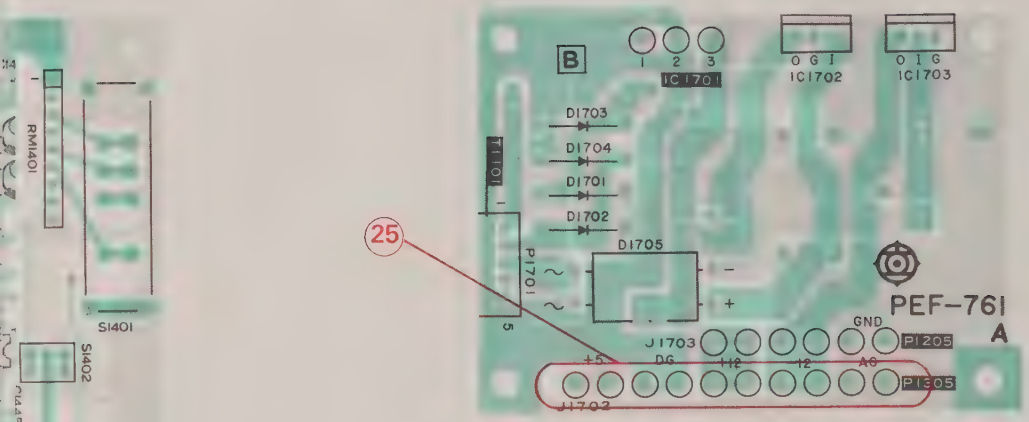
PEF-759A



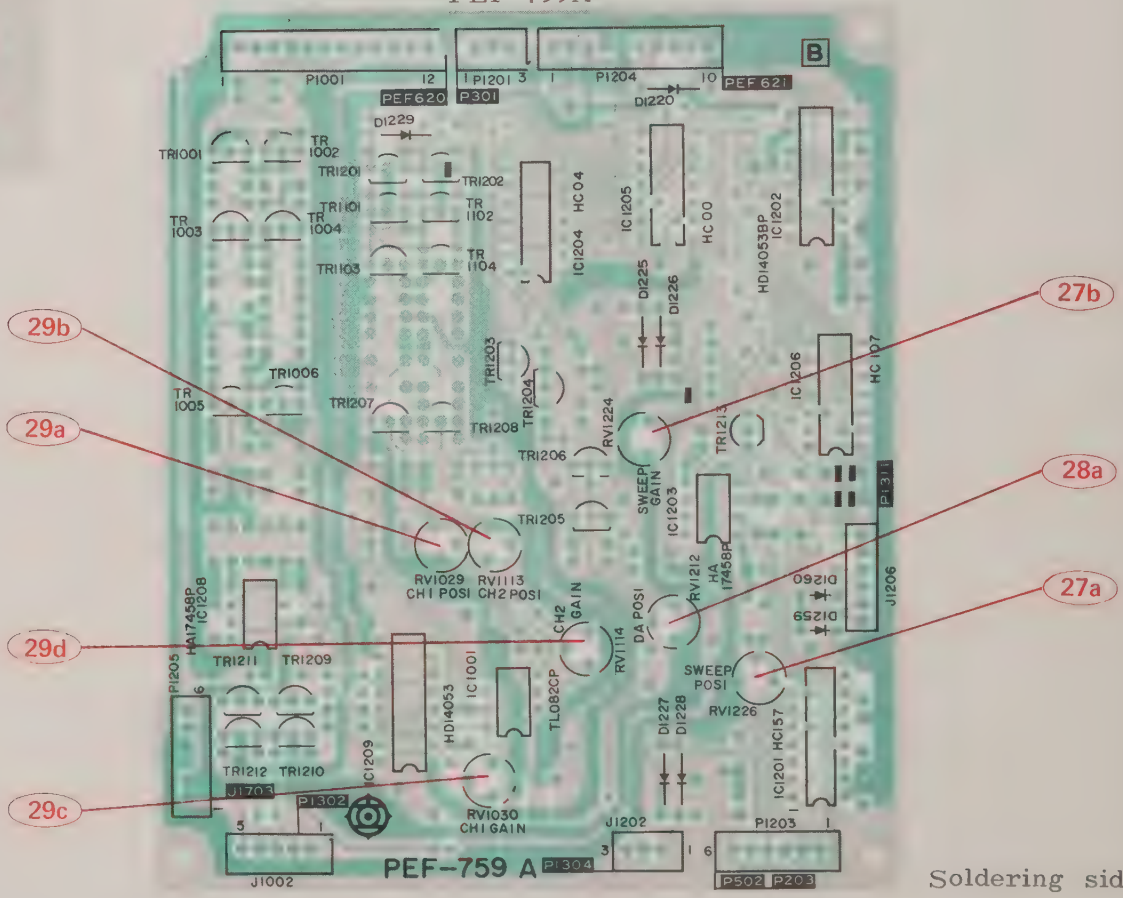
Parts side


PEF-760A
30b
30a

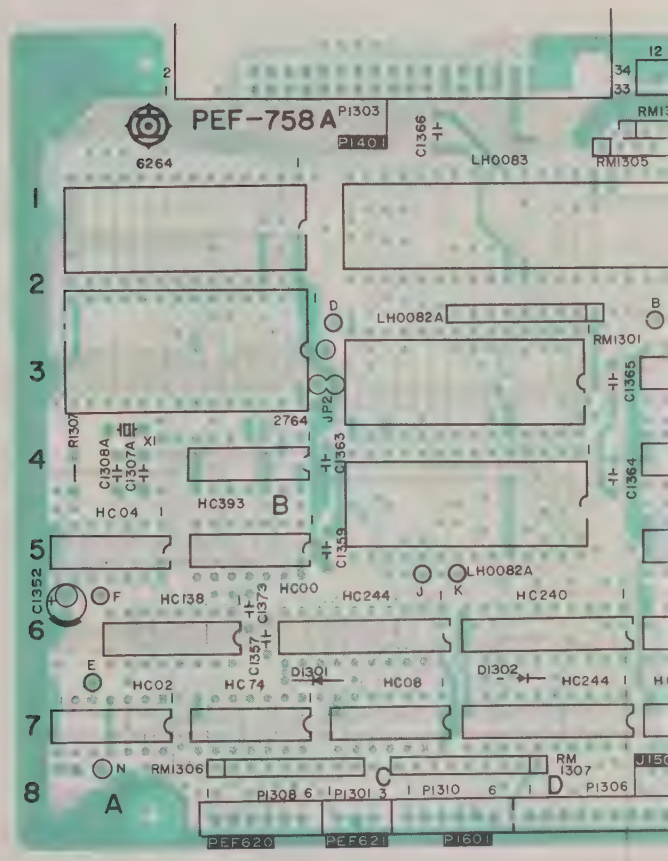
PEF-761A



PEF-759A



Soldering side


PEF-758A
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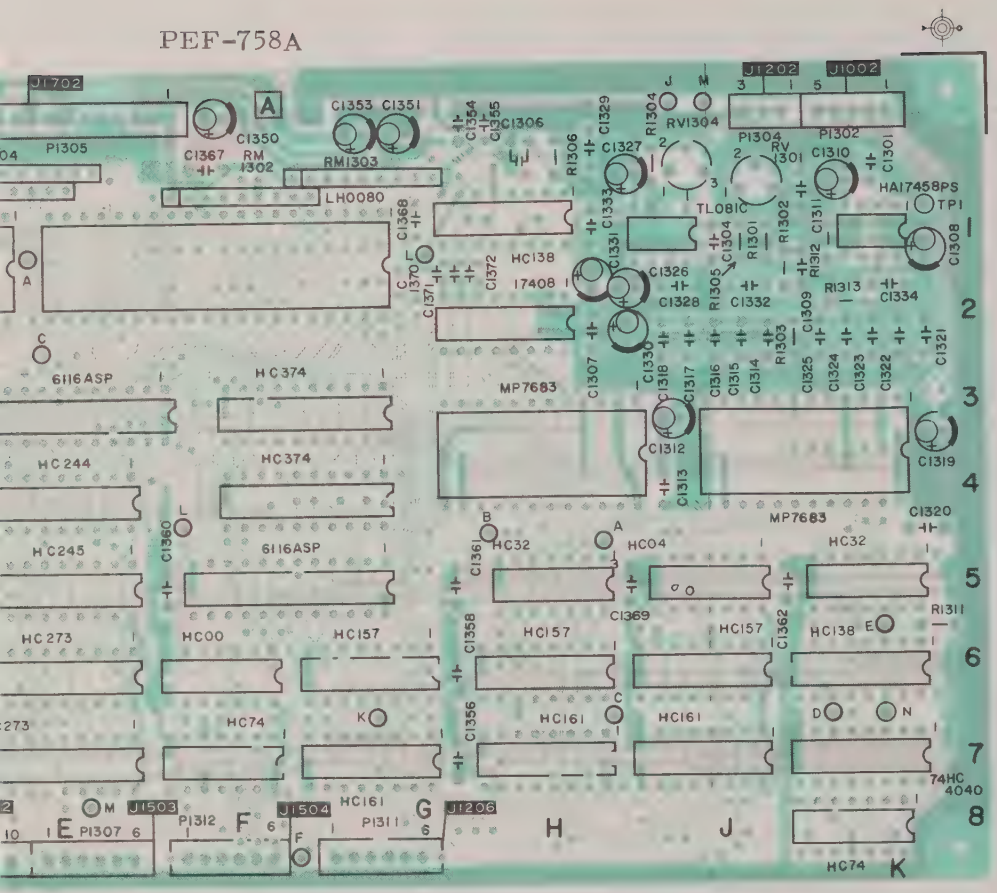
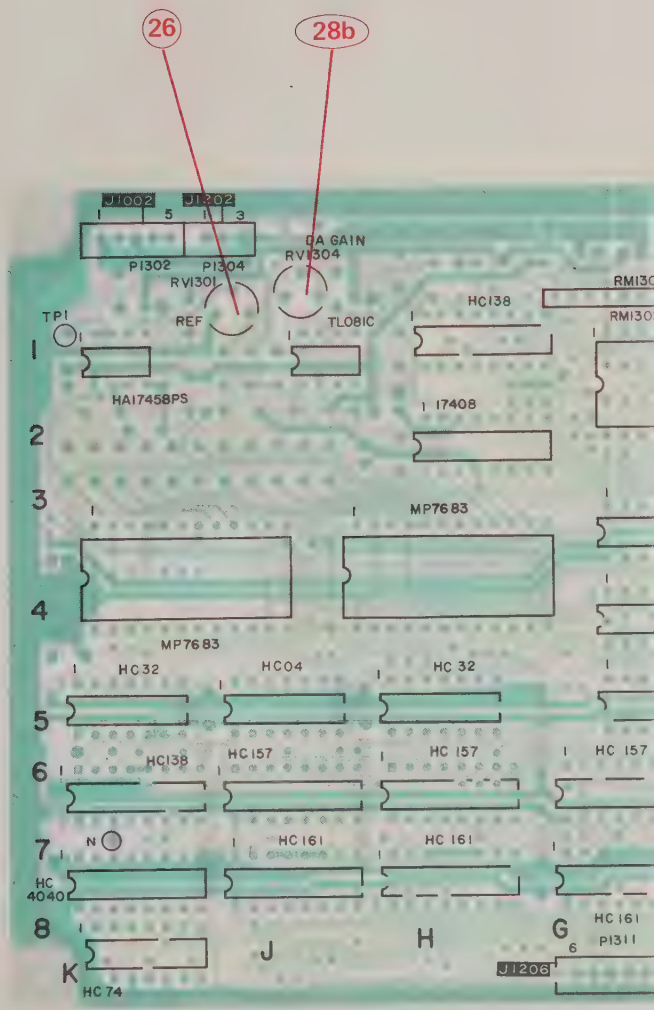
P1303
P1401
C1366
LH0083
RM1305
LH0082A
RM1301
C1365
C1364
JP2
2764
R1307
C1308A
C1307A
X1
C1363
HC04
HC393
B
C1359
C1352
HC138
HC00
HC244
HC240
C1373
C1357
HC02
HC74
D1301
HC08
D1302
RM1306
RM 1307
P1308
P1301
P1310
P1306
PEF620
PEF621
P1601

PB42A

PEF-758A



Parts side


26
28b
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J1202
5
3
P1302
P1304
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RV1304
RV1301
REF
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17408
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HC04
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HC138
HC157
HC 157
HC 157
N
HC161
HC 161
HC
4040
HC 161
P1311
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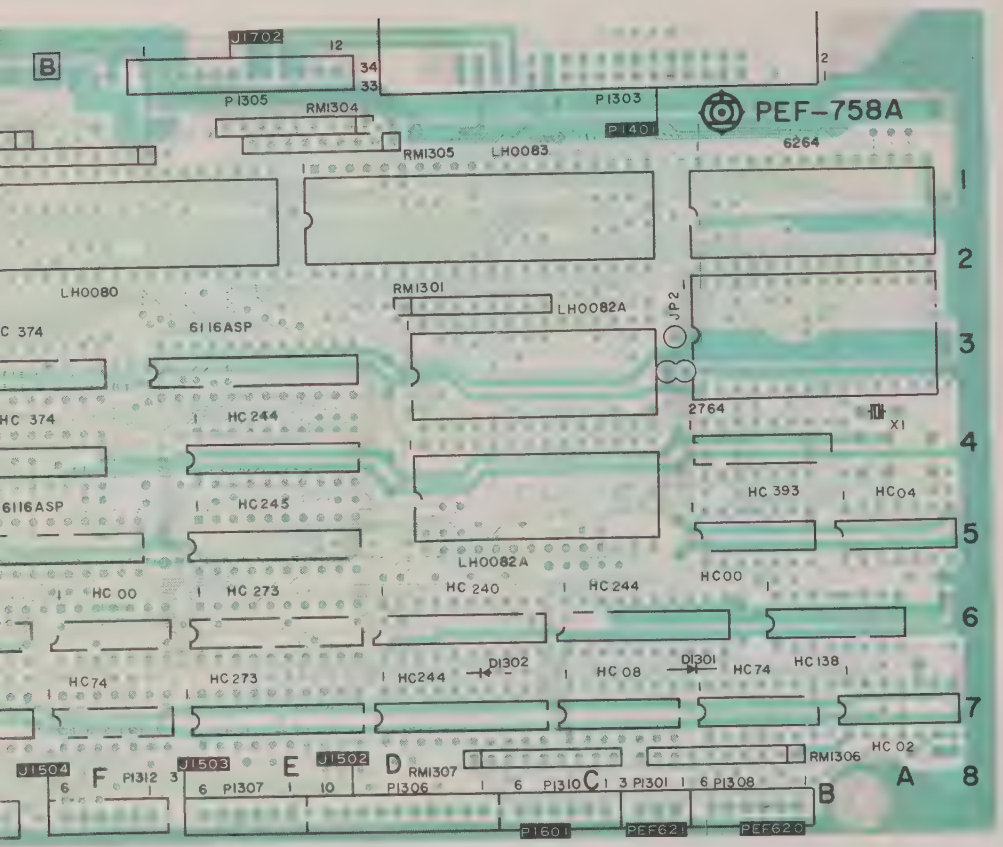
7
8
G
H
J
K

PEF-758A



Soldering side

7. ELECTRICAL PARTS LIST

① INPUT AMP

PB-14 (PEF-622) INPUT

Symbol	Part Code	Description	Q'ty
C 1	CQX0068	C, Plastic 400V 0.047μF ±10%	1
C 101	CQX0068	C, Plastic 400V 0.047μF ±10%	1
S 1	8393985	SW, Lever SLE623	1
S 101	8393985	SW, Lever SLE623	1
S 202	8393985	SW, Lever SLE623	1

PB-14 (PEF-620) CH1 ATT

Symbol	Part Code	Description	Q'ty
C 5	CCG0139	C, Ceramic 50V 47pF ±5%	1
C 9	CCG0144	C, Ceramic 50V 220pF ±5%	1
C 10	CCG0142	C, Ceramic 50V 82pF ±5%	1
R 2	RME0860	R, Metal 1/8W 47Ω ±5%	1
R 4	RMS0043	R, Metal 1/4W 900kΩ ±0.5%	1
R 5	RME1163	R, Metal 1/4W 111kΩ ±0.5%	1
R 7	RMS0044	R, Metal 1/4W 990kΩ ±0.5%	1
R 8	RME1156	R, Metal 1/4W 10.1kΩ ±0.5%	1
R 9	RME0852	R, Metal 1/8W 10Ω ±5%	1
R 10	RME0864	R, Metal 1/8W 100Ω ±5%	1
R 12	RCE0749	R, Carbon 1/4W 22Ω ±5%	1

PB-14 (PDP-620) CH1 INPUT + 2ND ATT

Symbol	Part Code	Description	Q'ty
ATT 1	8398872A	SW, Rotary ADR-255S	1
C 16	CCD0286	C, Ceramic 500V 1000pF +100 -0%	1
C 18	CCC0996	C, Ceramic 50V 2pF ±0.25pF	1
C 20	CCC1014	C, Ceramic 50V 47pF ±5%	1
C 23	CQA0091	C, Plastic 50V 1000pF ±10%	1
C 25	CCC1014	C, Ceramic 50V 47μF ±5%	1
C 26	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 30	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 40	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 42	CCC1007	C, Ceramic 50V 22pF ±5%	1
C 44	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 53	CEX0189	C, AL Elyc 16V 10μF BP	1
CV 3	CVE0059	C, Variable ECR-HA010A41	1
CV 4	CVE0065	C, Variable ECR-HA007A41	1
CV 6	CVE0059	C, Variable ECR-HA010A41	1
CV 7	CVE0064	C, Variable ECR-HA003A41	1
D 16	HDS0437	Diode 1SS133	1
D 21	HDS0477	Diode 1SS110	1
D 51	HDS0407	Diode SR503D (RED)	1
IC 16	8397023A	IC, Analog LF411CN	1
L 34	TLE0107	Inductor ELE-Y R47 MA	1
R 16	RME1168	R, Metal 1/4W 500kΩ ±0.5%	1
R 17	RME1168	R, Metal 1/4W 500kΩ ±0.5%	1
R 18	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 19	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 20	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 21	RSE0434	R, Solid 1/4W 10MΩ ±5%	1
R 23	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 25	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 26	RME1081	R, Metal 1/4W 5.62kΩ ±1%	1
R 30	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 33	RCE0762	R, Carbon 1/4W 270Ω ±5%	1
R 34	RME1145	R, Metal 1/4W 60.0Ω ±0.5%	1
R 35	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 36	RME1154	R, Metal 1/4W 600Ω ±0.5%	1
R 40	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 41	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 42	RCE0764	R, Carbon 1/4W 390Ω ±5%	1
R 43	RCE0767	R, Carbon 1/4W 680Ω ±5%	1
R 44	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 45	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 46	RME1157	R, Metal 1/4W 16.0kΩ ±0.5%	1
R 47	RME1162	R, Metal 1/4W 80.0kΩ ±0.5%	1
R 48	RME1157	R, Metal 1/4W 16.0kΩ ±0.5%	1
R 49	RME1155	R, Metal 1/4W 4.00kΩ ±0.5%	1
R 50	RME1157	R, Metal 1/4W 16.0kΩ ±0.5%	1
R 51	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 52	RME1069	R, Metal 1/4W 562Ω ±1%	1
R 53	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 54	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 55	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 56	RME1157	R, Metal 1/4W 16.0kΩ ±0.5%	1
R 57	RME1155	R, Metal 1/4W 4.00kΩ ±0.5%	1
RM 43	3173846B	R, Block For ATT	1
RV 22	RNE0057	VR, Metal EVN 49C00YB54 (50K)	1
RV 33	RNE0048	VR, Metal EVN 39C00YB22 (200)	1
TR 24	HTK0099	Transistor 2SK404E	1
TR 30	HTC0148	Transistor 2SC458-C-	1
TR 40	HTA0224	Transistor 2SA1029 D	1
D 20	HDS0477	Diode 1SS110	1
D 22	HDS0477	Diode 1SS110	1

PB-14 (PEF-620) CH1 PREAMP

Symbol	Part Code	Description	Q'ty
C 61	CCC1011	C, Ceramic 50V 33 pF ±5%	1
C 67	CQA0099	C, Plastic 50V 22000 pF ±10%	1
C 69	CCC1365	C, Ceramic 50V 680 pF ±10%	1
C 71	CCC1365	C, Ceramic 50V 680 pF ±10%	1
C 72	CCC1030	C, Ceramic 50V 10000 pF +80% −20%	1
C 77	CCC0997	C, Ceramic 50V 3 pF ±0.25pF	1
R 59	RCE0759	R, Carbon 1/4W 150Ω ±5%	1
R 60	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1
R 61	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 62	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 63	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 63A	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 64	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 64A	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 65	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 66	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 67	RCE0758	R, Carbon 1/4W 120Ω ±5%	1
R 68	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 69	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 70	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 71	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 72	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 73	RME1070	R, Metal 1/4W 681Ω ±1%	1
R 74	RME1070	R, Metal 1/4W 681Ω ±1%	1
R 75	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 76	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 77	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
RV 61	RDE0003	VR, Carbon EVH-YK3325B14	1
RV 62	RNE0049	VR, Metal EVN 39C00YB12 (100)	1
RV 63	RNE0047	VR, Metal EVN 39C00YB54 (50k)	1
TR 61	HTC0168	Transistor 2SC535-C-	1
TR 62	HTC0168	Transistor 2SC535-C-	1
TR 63	HTA0224	Transistor 2SA1029 D	1
TR 64	HTA0224	Transistor 2SA1029 D	1

PB-14 (PEF-620) CH2 ATT

Symbol	Part Code	Description	Q'ty
C 105	CCG0139	C,Ceramic 50V 47pF ±5%	1
C 109	CCG0144	C, Ceramic 50V 220 pF ±5%	1
C 110	CCG0142	C,Ceramic 50V 82pF ±5%	1
R 102	RME0860	R, Metal 1/8W 47Ω ±5%	1
R 104	RMS0043	R, Metal 1/4W 900kΩ ±0.5%	1
R 105	RME1163	R, Metal 1/4W 111kΩ ±0.5%	1
R 107	RMS0044	R, Metal 1/4W 990kΩ ±0.5%	1
R 108	RME1156	R, Metal 1/4W 10.1kΩ ±0.5%	1
R 109	RME0852	R, Metal 1/8W 10Ω ±5%	1
R 110	RME0864	R, Metal 1/8W 100Ω ±5%	1
R 112	RCE0749	R, Carbon 1/4W 22Ω ±5%	1

PB-14 (PEF-620) CH2 INPUT + 2ND ATT

Symbol	Part Code	Description	Q'ty
ATT101	8398872A	SW, Rotary ADR-255S	1
C 116	CCD0286	C, Ceramic 500V 1000 pF +100% −0%	1
C 118	CCC0996	C, Ceramic 50V 2 pF ±0.25pF	1
C 120	CCC1014	C, Ceramic 50V 47 pF ±5%	1
C 123	CQA0091	C, Plastic 50V 1000 pF ±10%	1
C 125	CCC1014	C, Ceramic 50V 47 pF ±5%	1
C 126	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 130	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 140	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 142	CCC1007	C, Ceramic 50V 22 pF ±5%	1
C 144	CES0028	C, AL Elyc 10V 47μF ±20%	1
CV 103	CVE0059	C, Variable ECR-HA010A41	1
CV 104	CVE0065	C, Variable ECR-HA007A41	1
CV 106	CVE0059	C, Variable ECR-HA010A41	1
CV 107	CVE0064	C, Variable ECR-HA003A41	1
D 116	HDS0437	Diode 1SS133	1
D 121	HDS0477	Diode 1SS110	1
D 151	HDS0407	Diode SR5030D(RED)	1
IC 116	8397023A	IC, Analog LF411CN	1
L 134	TLE0107	Inductor ELE-Y R47 MA	1
R 116	RMEq1168	R, Metal 1/4W 500kΩ ±0.5%	1
R 117	RME1168	R, Metal 1/4W 500kΩ ±0.5%	1
R 118	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 119	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 120	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 121	RSE0434	R, Solid 1/4W 10MΩ ±5%	1
R 123	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 125	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 126	RME1081	R, Metal 1/4W 5.62kΩ ±5%	1
R 130	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 133	RCE0762	R, Carbon 1/4W 270Ω ±5%	1
R 134	RME1145	R, Metal 1/4W 60.0Ω ±0.5%	1
R 135	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 136	RME1154	R, Metal 1/4W 600Ω ±0.5%	1
R 140	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 141	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 142	RCE0764	R, Carbon 1/4W 390Ω ±5%	1
R 143	RCE0767	R, Carbon 1/4W 680Ω ±5%	1
R 144	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 145	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 146	RME1157	R, Metal 1/4W 16.0kΩ ±0.5%	1
R 147	RME1162	R, Metal 1/4W 80.0kΩ ±0.5%	1
R 148	RME1155	R, Metal 1/4W 4.00kΩ ±0.5%	1
R 151	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
RM 143	3173846B	R, Block For ATT	1
RV 122	RNE0057	VR, Metal EVN 49C00YB54 (50K)	1
RV 133	RNE0048	VR, Metal EVN 39C00YB22 (200)	1
TR 124	HTK0099	Transistor 2SK404E	1
TR 130	HTC0148	Transistor 2SC458-C-	1
TR 140	HTA0224	Transistor 2SA1029 D	1
D 120	HDS0477	Diode 1SS133	1
D 122	HDS0477	Diode 1SS133	1

PB-14 (PEF-620) CH2 PRE AMP

Symbol	Part Code	Description	Q'ty
C 167	CQA0099	C, Plastic 50V 22000pF ±10%	1
C 169	CCC1365	C, Ceramic 50V 680pF ±10%	1
C 171	CCC1365	C, Ceramic 50V 680pF ±10%	1
C 172	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 179	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
CV 161	CVE0060	C, Variable ECR-HA020D41	1
R 159	RCE0759	R, Carbon 1/4W 150Ω ±5%	1
R 160	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1
R 161	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 162	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 163	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 164	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 165	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 166	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 167	RCE0758	R, Carbon 1/4W 120Ω ±5%	1
R 168	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 169	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 170	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 171	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 172	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 173	RME1070	R, Metal 1/4W 681Ω ±1%	1
R 174	RME1070	R, Metal 1/4W 681Ω ±1%	1
R 175	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 176	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 177	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 178	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 179	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
RV 161	RDE0003	VR, Carbon EVH-YK3325B14	1
RV 162	RNE0049	VR, Metal EVN 39C00YB12 (100)	1
RV 163	RNE0047	VR, Metal EVN 39C00YB54 (50K)	1
TR 161	HTC0168	Transistor 2SC535-C-	1
TR 162	HTC0168	Transistor 2SC535-C-	1
TR 163	HTA0224	Transistor 2SA1029 D	1
TR 164	HTA0224	Transistor 2SA1029 D	1
TR 165	HTA0224	Transistor 2SA1029 D	1
TR 166	HTA0224	Transistor 2SA1029 D	1

② VERT PREAMP, TRIG PICKOFF

PB-14 (PEF-620) CH1 TRIG PICK OFF + CH1

Symbol	Part Code	Description	Q'ty
C 83	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 86	CCC1365	C, Ceramic 50V 680pF ±10%	1
C 90	CCC1365	C, Ceramic 50V 680pF ±10%	1
C 91	CCC1365	C, Ceramic 50V 680pF ±10%	1
C 94	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 96	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 97	CCC1027	C, Ceramic 50V 220pF ±10%	1
D 97	HDH0024	Diode Zenner HZ-3B	1
R 82	RME1107	R, Metal 1/4W 86.6Ω ±1%	1
R 83	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 84	RCE0759	R, Carbon 1/4W 150Ω ±5%	1
R 85	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 86	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 87	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 88	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 89	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 90	RCE0763	R, Carbon 1/4W 330Ω ±5%	1
R 91	RCE0763	R, Carbon 1/4W 330Ω ±5%	1
R 93	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 94	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 95	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 96	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 97	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 98	RCE0767	R, Carbon 1/4W 680Ω ±5%	1
R 99	RCE0767	R, Carbon 1/4W 680Ω ±5%	1
RV 85	RNE0051	VR, Metal EVN 39C00YB14 (10K)	1
TR 85	HTC0168	Transistor 2SC535-C-	1
TR 86	HTC0168	Transistor 2SC535-C-	1
TR 87	HTC0148	Transistor 2SC458-C-	1

PB-14 (PEF-620) CH2 TRIG PICK OFF

Symbol	Part Code	Description	Q'ty
C 186	CCC1365	C, Ceramic 50V 680pF ±10%	1
C 190	CCC1365	C, Ceramic 50V 680pF ±10%	1
R 184	RCE0759	R, Carbon 1/4W 150Ω ±5%	1
R 185	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 186	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 187	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 188	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 189	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 190	RCE0763	R, Carbon 1/4W 330Ω ±5%	1
R 191	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%	1
R 192	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
RV 185	RNE0051	VR, Metal EVN 39C00YB14 (10K)	1
TR 185	HTC0168	Transistor 2SC535-C-	1
TR 186	HTC0168	Transistor 2SC535-C-	1

PB-14 (PB-620) VERT SWITCHING

Symbol	Part Code	Description	Q'ty
C 221	CCC1160	C, Ceramic 50V 330pF ±10%	1
C 222	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 223	CCC1160	C, Ceramic 50V 330pF ±10%	1
C 224	CES0028	C, AL Elyc 10V 47μF ±20%	1
D 221	HDS0437	Diode 1SS133	1
D 222	HDS0437	Diode 1SS133	1
D 224	HDS0437	Diode 1SS133	1
D 225	HDS0437	Diode 1SS133	1
D 226	HDS0437	Diode 1SS133	1
D 230	HDS0437	Diode 1SS133	1
D 231	HDS0437	Diode 1SS133	1
IC 222	IDH0467	IC, Digital HD74LS00P	1
IC 226	IDH0586	IC, Digital HD74LS74AP	1
R 221	RCE0750	R, Carbon 1/4W 27Ω ±5%	1
R 222	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 223	RCE0750	R, Carbon 1/4W 27Ω ±5%	1
R 224	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 225	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 226	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 228	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 229	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%	1
R 230	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 231	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 232	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 233	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 234	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 235	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 236	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 237	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 238	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 239	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
S 201	3165210	SW, Rotary SBU 1025	1
TR 232	HTA0224	Transistor 2SA1029D	1

PB-14 (PEF-620) INT TRIG AMP

Symbol	Part Code	Description	Q'ty
C 241	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 242	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 243	CCC1007	C, Ceramic 50V 22pF ±5%	1
C 244	CCC1007	C, Ceramic 50V 22pF ±5%	1
C 245	CQA0097	C, Plastic 50V 10000pF ±10%	1
C 248	CCC1032	C, Ceramic 50V 82pF ±5%	1
D 243	HDS0437	Diode 1SS133	1
D 244	HDS0437	Diode 1SS133	1

Symbol	Part Code	Description	Q'ty
R 241	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 242	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 243	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 244	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 245	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 246	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 247	RCE0768	R, Carbon 1/4W 820Ω ±5%	1
R 248	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 250	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
TR 241	HTC0192	Transistor 2SC641K-C	1
TR 242	HTC0192	Transistor 2SC641K-C	1
TR 246	HTA0224	Transistor 2SA1029 D	1

PB-14 (PEF-620) CAL

Symbol	Part Code	Description	Q'ty
C 1201	CCC1002	C, Ceramic 50V 1000pF ±10%	1
C 1202	CQA0091	C, Plastic 50V 1000pF ±10%	1
C 1208	CQA0099	C, Plastic 50V 22000pF ±10%	1
C 1210	CES0028	C, AL Elyc 10V 47μF ±20%	1
R 1201	RME1174	R, Metal 1/4W 2.00kΩ ±1%	1
R 1202	RME1065	R, Metal 1/4W 267Ω ±1%	1
R 1203	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 1204	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1205	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 1206	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 1207	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1208	RCE0787	R, Carbon 1/4W 33kΩ ±5%	1
R 1209	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1210	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
RV 1201	RNE0058	VR, Metal EVN 39C00YB13 (1K)	1
TR 1201	HTA0224	Transistor 2SA1029D	1
TR 1208	HTC0148	Transistor 2SC458-C-	1
TR 1209	HTC0148	Transistor 2SC458-C-	1

PB-14 (PEF-620) V OUT DRIVER

Symbol	Part Code	Description	Q'ty
C 201	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 207	CCC1014	C, Ceramic 50V 47pF ±5%	1
C 210	CEX0189	C, AL Elyc 16V 10μF BP	1
D 201	HDS0437	Diode 1SS133	1
D 202	HDS0437	Diode 1SS133	1
D 203	HDS0437	Diode 1SS133	1
D 204	HDS0437	Diode 1SS133	1
D 205	HDS0437	Diode 1SS133	1
D 206	HDS0437	Diode 1SS133	1
D 207	HDS0437	Diode 1SS133	1
D 208	HDS0437	Diode 1SS133	1
R 201	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 202	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 203	RME1066	R, Metal 1/4W 332Ω ±1%	1
R 204	RME1066	R, Metal 1/4W 332Ω ±1%	1
R 205	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 206	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 207	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 208	RME1066	R, Metal 1/4W 332Ω ±1%	1
R 209	RME1066	R, Metal 1/4W 332Ω ±1%	1
R 210	RCE0791	R, Carbon 1/4W 68kΩ ±5%	1
R 211	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 212	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 213	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 214	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 215	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 216	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
TR 201	HTC0338	Transistor 2SC1906	1
TR 202	HTC0338	Transistor 2SC1906	1

③ V OUT AMP

PB-14 (PEF-620) V OUT AMP

Symbol	Part Code	Description	Q'ty
C 270	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 271	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 301	CET0033	C, AL Elyc 160V 1μF	1
C 302	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 303	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 304	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 305	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 337	CCC1032	C, Ceramic 50V 82pF ±5%	1
C 338	CCC1011	C, Ceramic 50V 33pF ±5%	1
C 363	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 364	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 365	CCC1034	C, Ceramic 50V 68pF ±5%	1
C 366	CCC1014	C, Ceramic 50V 47pF ±5%	1
C 367	CCD0273	C, Ceramic 500V 2pF ±0.25pF	1
C 368	CCD0273	C, Ceramic 500V 2pF ±0.25pF	1
C 379	CCD0217	C, Ceramic 500V 1000pF ±10%	1
C 380	CCD0217	C, Ceramic 500V 1000pF ±10%	1
C 385	CCC0591	C, Ceramic 500V 10000pF	1
C 386	CCC0591	C, Ceramic 500V 10000pF	1
C 389	CCD0287	C, Ceramic 500V 4700pF +100 −0%	1
CV 337	CVE0062	C, Variable ECR-HA040E41	1
CV 366	CVE0062	C, Variable ECR-HA040E41	1
D 374	HDH0029	Diode HZ5B (Zener)	1
D 375	HDH0029	Diode HZ5B (Zener)	1
D 377	HDH0029	Diode HZ5B (Zener)	1
L 385	TLE0091	Coil ELE-Y 2R2MA	1
L 386	TLE0091	Coil ELE-Y 2R2MA	1
R 331	RME1062	R, Metal 1/4W 150Ω ±1%	1
R 332	RME1062	R, Metal 1/4W 150Ω ±1%	1
R 336	RCE0754	R, Carbon 1/4W 56Ω ±5%	1
R 337	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 338	RCE0759	R, Carbon 1/4W 150Ω ±5%	1
R 339	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 340	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 342	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1
R 343	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1
R 344	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 363	RME1065	R, Metal 1/4W 267Ω ±1%	1
R 364	RME1065	R, Metal 1/4W 267Ω ±1%	1
R 365	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 366	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 367	RMR3724	R, Metal 1W 10kΩ ±5%	1
R 368	RMR3724	R, Metal 1W 10kΩ ±5%	1
R 369	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 371	RCE0751	R, Carbon 1/4W 33Ω ±5%	1
R 372	RCE0751	R, Carbon 1/4W 33Ω ±5%	1
R 373	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 374	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 375	RCE0751	R, Carbon 1/4W 33Ω ±5%	1
R 376	RCE0751	R, Carbon 1/4W 33Ω ±5%	1
R 377	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 378	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 381	RCE0715	R, Carbon 1/2W 6.8kΩ ±5%	1
R 382	RCE0715	R, Carbon 1/2W 6.8kΩ ±5%	1
R 383	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 384	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 385	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 386	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 387	RCE0715	R, Carbon 1/2W 6.8kΩ ±5%	1

④ TRIG GEN

PB-15 (PEF-621) TRIG GEN

Symbol	Part Code	Description	Q'ty
R 388	RCE0715	R, Carbon 1/2W 6.8kΩ ±5%	1
R 389	RCE0723	R, Carbon 1/2W 33kΩ ±5%	1
R 390	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 391	RME1068	R, Metal 1/4W 475Ω ±1%	1
R 398	RCE0414	R,Carbon 1/4W 120Ω ±5%	1
R 399	RCE0414	R,Carbon 1/4W 120Ω ±5%	1
RV 339	RNE0050	VR, Metal EVN 39C00YB52(500)	1
TR 331	HTC0192	Transistor 2SC641K-C	1
TR 332	HTC0192	Transistor 2SC641K-C	1
TR 365	HTC0721	Transistor 2SC2901	1
TR 366	HTC0721	Transistor 2SC2901	1
TR 371	HTC0669	Transistor 2SC2912S	1
TR 372	HTC0669	Transistor 2SC2912S	1
TR 375	HTA0258	Transistor 2SA1210S	1
TR 376	HTA0258	Transistor 2SA1210S	1
TR 377	HTA0099	Transistor 2SA781K	1
TR 378	HTA0099	Transistor 2SA781K	1
TR 390	HTA0099	Transistor 2SA781K	1
R 392	RME1071	R,Metal 1/4W 825Ω ±1%	1

Symbol	Part Code	Description	Q'ty
C 402	CCD0279	C, Ceramic 500V 22 pF ±5%	1
C 403	CQX0068	C, Plastic 400V 0.047μF ±10%	1
C 404	CCC1029	C, Ceramic 50V 1000 pF	1
C 407	CCC0999	C, Ceramic 50V 5 pF ±0.25pF	1
C 408	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 417	CES0213	C, AL Elyc 16V 10μF ±20% BP	1
C 418	CCC1030	C, Ceramic 50V 10000 pF +80% −20%	1
C 425	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 442	CES0249	C, AL Elyc 50V 1μF ±20% BP	1
C 444	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 452	CQA0097	C, Plastic 50V 10000 pF ±10%	1
C 460	CES0028	C, AL Elyc 10V 47μF ±20%	1
D 401	HDS0437	Diode 1SS133	1
D 444	HDS0437	Diode 1SS133	1
IC 401	IDH0467	IC, Digital HD74LS00P	1
R 401	RCE0800	R, Carbon 1/4W 470kΩ ±5%	1
R 402	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 404	RCE0764	R, Carbon 1/4W 390Ω ±5%	1
R 406	RCE0800	R, Carbon 1/4W 470kΩ ±5%	1
R 407	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 408	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 409	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 417	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 418	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%	1
R 420	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 425	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 430	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 432	RCE0767	R, Carbon 1/4W 680Ω ±5%	1
R 433	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 434	RCE0689	R, Carbon 1/2W 47Ω ±5%	1
R 435	RCE0774	R, Carbon 1/4W 2.7kΩ ±5%	1
R 436	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 437	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 438	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 439	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 441	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 443	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 444	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 445	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 450	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 452	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 460	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
RV 418	RDE0003	VR, Carbon EVH-YK3325B14	1
RV 420	RNE0051	VR, Metal EVN 39C00YB14(10K)	1
S 401	8374067D	SW, Lever SLR024 (Lever 12 MM)	1
S 403	8374067D	SW, Lever SLR024 (Lever 12 MM)	1
TR 401	HTK0099	Transistor 2SK404E	1
TR 431	HTC0168	Transistor 2SC535-C-	1
TR 432	HTC0168	Transistor 2SC535-C-	1
TR 441	HTA0224	Transistor 2SA1029 D	1

⑤ SWEEP GEN

PB-15 (PEF-621) SWP GEN

Symbol	Part Code	Description	Q'ty
C 501	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 505	CCC1133	C, Ceramic 50V 1pF	1
C 507	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 510	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 511	CES0036	C, AL Elyc 25V 22μF ±20%	1
C 519	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 520	CCC1032	C, Ceramic 50V 82pF ±5%	1
C 524	CCC1001	C, Ceramic 50V 8pF ±0.5pF	1
C 525	CQE0049	C, Plastic ECQ-E1105JN(JNB) Type-1	1
C 526	CQE0050	C, Plastic ECQ-P1103JZ (100V 0.01μF)	1
C 527	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 528	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 530	CCC1025	C, Ceramic 50V 100pF ±10%	1
C 544	CQA0099	C, Plastic 50V 22000pF ±10%	1
C 545	CES0249	C, AL Elyc 50V 1μF ±20%BP	1
C 550	CCC1014	C, Ceramic 50V 47pF ±5%	1
C 551	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 552	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 553	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 554	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 571	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 572	CCC1014	C, Ceramic 50V 47pF ±5%	1
C 573	CCC1027	C, Ceramic 50V 220pF ±10%	1
C 577	CES0028	C, AL Elyc 10V 47μF ±20%	1
CV 520	CVE0062	C, Variable ECR-HA040E41	1
D 501	HDS0437	Diode 1SS133	1
D 520	HDM0051	Diod MA161	1
D 521	HDM0051	Diode MA161	1
D 522	HDM0051	Diode MA161	1
D 530	HDS0437	Diode 1SS133	1
D 535	HDM0051	Diode MA161	1
D 536	HDS0437	Diode 1SS133	1
D 541	HDS0437	Diode 1SS133	1
D 543	HDS0407	Diode SR503D (Red)	1
D 571	HDS0437	Diode 1SS133	1
D 572	HDS0437	Diode 1SS133	1
D 573	HDS0437	Diode 1SS133	1
D 574	HDS0437	Diode 1SS133	1
IC 501	IDH0586	IC, Digital HD74LS74AP	1
IC 502	IDH0469	IC, Digital HD74LS03P	1
IC 550	IDH0802	IC, Digital HD14053BP	1
IC 571	IDH0646	IC, Digital HD74LS02P	1
R 501	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 502	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 503	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 504	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 505	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 506	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 507	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 508	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 509	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 510	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 513	RCE0780	R, Carbon 1/4W 8.2kΩ ±5%	1
R 514	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 515	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 519	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 520	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 521	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1

Symbol	Part Code	Description	Q'ty
R 522	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 523	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 524	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 525	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 526	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%	1
R 527	RSE0434	R, Solid 1/4W 10MΩ ±5%	1
R 528	RCE0736	R, Carbon 1/2W 1.5MΩ ±5%	1
R 529	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 530	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 531	RME1174	R, Metal 1/4W 2.00kΩ ±1%	1
R 532	RME1078	R, Metal 1/4W 3.32kΩ ±1%	1
R 533	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 534	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 535	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 536	RCE0774	R, Carbon 1/4W 2.7kΩ ±5%	1
R 540	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 541	RCE0764	R, Carbon 1/4W 390Ω ±5%	1
R 542	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 543	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 544	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 545	RCE0780	R, Carbon 1/4W 8.2kΩ ±5%	1
R 546	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 547	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 548	RCE0778	R, Carbon 1/4W 5.6kΩ ±5%	1
R 549	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 550	RCE0778	R, Carbon 1/4W 5.6kΩ ±5%	1
R 551	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 552	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 553	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 554	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 555	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 556	RCE0767	R, Carbon 1/4W 680Ω ±5%	1
R 571	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 572	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%	1
R 573	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 574	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 576	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 578	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%	1
R 581	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
RM 520	3173847B	R, Block For Timing	1
RV 540	8397021	VR, Carbon V16L5(7X6.5) 20KC-B2KΩ	1
RV 542	RNE0052	VR, Metal EVN 39C00YB23(2K)	1
RV 550	RNE0058	VR, Metal EVN 39C00YB13(1K)	1
S 501	8404097	SW, Rotary S21P2YL	1
TR 503	HTA0224	Transistor 2SA1029 D	1
TR 514	HTC0148	Transistor 2SC458-C-	1
TR 520	HTK0081	Transistor 2SK304E	1
TR 521	HTC0148	Transistor 2SC458-C-	1
TR 522	HTC0148	Transistor 2SC458-C-	1
TR 532	HTC0148	Transistor 2SC458-C-	1
TR 544	HTC0148	Transistor 2SC458-C-	1
TR 545	HTC0148	Transistor 2SC458-C-	1

⑥ H.AMP

PB-15 (PEF-621) H AMP

Symbol	Part Code	Description	Q'ty
C 801	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 805	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1
C 806	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 808	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 811	CCC1002	C, Ceramic 50V 10pF	1
C 812	CCC1002	C, Ceramic 50V 10pF	1
C 823	CCC1004	C, Ceramic 50V 39pF ±5%	1
C 832	CCC1007	C, Ceramic 50V 22pF ±5%	1
C 845	CCD0330	C, Ceramic 500V 2pF ±0.25pF	1
C 846	CCD0330	C, Ceramic 500V 2pF ±0.25pF	1
C 847	CCC1007	C, Ceramic 50V 22pF ±5%	1
C 848	CCC1007	C, Ceramic 50V 22pF ±5%	1
C 857	CCD0287	C, Ceramic 500V 4700pF +100 -0%	1
C 873	CCC1025	C, Ceramic 50V 100pF ±10%	1
C 874	CCC1025	C, Ceramic 50V 100pF ±10%	1
C 880	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1
CV 840	CVE0062	C, Variable ECR-HA040E41	1
D 851	HDS0437	Diode 1SS133	1
D 852	HDS0437	Diode 1SS133	1
D 853	HDS0437	Diode 1SS133	1
D 854	HDS0437	Diode 1SS133	1
L 852	TLF0148	Coil FL-7H6.8mH ±5%	1
R 801	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%	1
R 802	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 804	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 805	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 806	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 807	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 808	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 811	RME1076	R, Metal 1/4W 2.21kΩ ±1%	1
R 812	RME1076	R, Metal 1/4W 2.21kΩ ±1%	1
R 813	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 814	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1
R 821	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 822	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 823	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 824	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%	1
R 831	RCE0762	R, Carbon 1/4W 270Ω ±5%	1
R 832	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 833	RME1076	R, Metal 1/4W 2.21kΩ ±1%	1
R 834	RME1076	R, Metal 1/4W 2.21kΩ ±1%	1
R 840	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 841	RME1079	R, Metal 1/4W 3.92kΩ ±1%	1
R 842	RME1079	R, Metal 1/4W 3.92kΩ ±1%	1
R 843	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 844	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 845	RMR3779	R, Metal 1W 100kΩ ±5%	1
R 846	RMR3779	R, Metal 1W 100kΩ ±5%	1
R 847	RCE0755	R, Carbon 1/4W 68Ω ±5%	1
R 851	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1
R 852	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1
R 853	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1
R 854	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1
R 855	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1
R 856	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1
R 857	RCE0763	R, Carbon 1/4W 330Ω ±5%	1
R 858	RCE0763	R, Carbon 1/4W 330Ω ±5%	1
R 859	RZZ0032	R, Fusing RF-25S 470Ω ±5%	1
R 860	RME1089	R, Metal 1/4W 26.7kΩ ±1%	1

Symbol	Part Code	Description	Q'ty
R 866	RME1090	R, Metal 1/4W 33.2kΩ ±1%	1
R 871	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 872	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 873	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 874	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 880	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 881	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
RV 805	RDE0003	VR, Carbon EVH-YK3325B14	1
RV 821	RNE0052	VR, Metal EVN 39C00YB23 (2K)	1
RV 824	RNE0053	VR, Metal EVN 39C00YB24 (20K)	1
RV 831	RNE0050	VR, Metal EVN 39C00YB52 (500)	1
S 502	8376780A	SW, PB SPJ222N (Lock)	1
TR 811	HTC0148	Transistor 2SC458-C-	1
TR 812	HTC0148	Transistor 2SC458-C-	1
TR 821	HTA0224	Transistor 2SA1029 D	1
TR 822	HTA0224	Transistor 2SA1029 D	1
TR 831	HTA0224	Transistor 2SA1029 D	1
TR 832	HTA0224	Transistor 2SA1029 D	1
TR 843	HTA0224	Transistor 2SA1029 D	1
TR 844	HTA0224	Transistor 2SA1029 D	1
TR 851	HTC0649	Transistor 2SC2610	1
TR 852	HTC0649	Transistor 2SC2610	1
TR 853	HTC0649	Transistor 2SC2610	1
TR 854	HTC0649	Transistor 2SC2610	1

⑦ HV & Z AMP

PB-15 (PEF-621) Z AMP

Symbol	Part Code	Description	Q'ty
C 901	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 904	CCD0272	C, Ceramic 500V 1pF ±0.25pF	1
C 908	CCD0287	C, Ceramic 500V 4700pF +100 -0%	1
C 912	CET0033	C, AL Elyc 160V 1μF	1
D 901	HDS0437	Diode 1SS133	1
D 902	HDS0437	Diode 1SS133	1
D 910	HDS0437	Diode 1SS133	1
R 901	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 902	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%	1
R 903	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%	1
R 904	RCE0725	R, Carbon 1/2W 47kΩ ±5%	1
R 906	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 907	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 908	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 909	RCE0798	R, Carbon 1/4W 330kΩ ±5%	1
R 910	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 911	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 912	RCE0745	R, Carbon 1/4W 10Ω ±5%	1
R 915	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 930	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 931	RCE0787	R, Carbon 1/4W 33kΩ ±5%	1
TR 901	HTC0192	Transistor 2SC641K-C	1
TR 906	HTC0148	Transistor 2SC458-C-	1
TR 910	HTA0277	Transistor 2SA1207S	1
TR 912	HTC0722	Transistor 2SC2909S	1
TR 931	HTA0104	Transistor 2SA778A K	1

PB-15 (PEF-621) HV

Symbol	Part Code	Description	Q'ty
C 1001	CQA0099	C, Plastic 50V 22000pF ±10%	1
C 1002	CES0035	C,AL Elyc 50V 47μF	1
C 1005	CQA0101	C, Plastic 50V 47000pF ±10%	1
C 1012	CCD0231	C, Ceramic 2000V 4700pF +80 -20%	1
C 1013	CCD0231	C, Ceramic 2000V 4700pF +80 -20%	1
C 1014	CCD0231	C, Ceramic 2000V 4700pF +80 -20%	1
C 1016	CCD0245	C, Ceramic 2000V 100pF ±10%	1
C 1020	CCD0286	C, Ceramic 500V 1000pF +100 -0%	1
C 1021	CET0033	C, AL Elyc 160V 1μF	1
C 1023	CCD0246	C, Ceramic 2kV 1000pF ±10%	1
C 1025	CCD0231	C, Ceramic 2000V 4700pF +80 -20%	1
C 1035	CCD0287	C, Ceramic 500V 4700pF +100 -0%	1
C 1038	CCD0287	C, Ceramic 500V 4700pF +100 -0%	1
D 1012	HDY0031	Diode Y10GA	1
D 1021	HDS0250	Diode 1SS83	1
D 1022	HDS0250	Diode 1SS83	1

Symbol	Part Code	Description	Q'ty
D 1023	HDS0250	Diode 1SS83	1
D 1024	HDS0250	Diode 1SS83	1
D 1038	HDH0072	Diode HZ22	1
F 1001	EFL0148	Fuse TSCR UL 125V 0.25A	1
F 1301	EFZ0013	IC, Protect ICP-F10 (0.4A)	1
NL 1024	ELS0032	Lamp SA-200DSS-ON-1	1
NL 1025	ELS0032	Lamp SA-200DSS-ON-1	1
R 1001	RMS0023	R, Metal 1/4W 1.43MΩ ±0.5%	1
R 1002	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1003	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1
R 1004	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 1005	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1006	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 1014	RCE0715	R, Carbon 1/2W 6.8kΩ ±5%	1
R 1016	RCE0800	R, Carbon 1/4W 470kΩ ±5%	1
R 1017	RMV0004	R, Metal 1/2W 22.1MΩ ±1%	1
R 1020	RCE0798	R, Carbon 1/4W 330kΩ ±5%	1
R 1021	RCE0785	R,Carbon 1/4W 22kΩ ±5%	1
R 1023	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1024	RSE0434	R, Solid 1/4W 10MΩ ±5%	1
R 1038	RCE0798	R, Carbon 1/4W 330kΩ ±5%	1
R 1350	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
RV 1021	RNE0054	VR, Metal EVN 39C00YB15(100K)	1
RV 1035	RNE0055	VR, Metal EVN 39C00YB25(200K)	1
RV 1348	8348450H	VR, Metal CR29R 22kΩ	1
T 1001	3180008	XFMR For V-211,212,222,422	1
TR 1001	HTK0081	Transistor 2SK304E	1
TR 1002	HTA0224	Transistor 2SA1029 D	1
TR 1006	HTD0155	Transistor 2SD313E	1
TR 1348	HTC0148	Transistor 2SC458-C-	1
TR 1349	HTA0224	Transistor 2SA1029 D	1

⑧ POWER SUPPLY

PB-15 (PEF-621) POWER

Symbol	Part Code	Description	Q'ty
C 1101	CES0201FY	C, AL Elyc 160V 47μF	1
C 1102	CES0203FY	C, AL Elyc 250V 47μF	1
C 1109	CES0202FY	C, AL Elyc 160V 10μF	1
C 1110	CQA0118	C, Plastic 50V 1500pF ±10%	1
C 1111	CES0204FY	C, AL Elyc 25V 2200μF	1
C 1112	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 1121	CES0204FY	C, AL Elyc 25V 2200μF	1
C 1122	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 1124	CQA0101	C, Plastic 50V 47000pF ±10%	1
C 1131	CES0036	C, AL Elyc 25V 22μF ±20%	1
C 1138	CES0028	C, AL Elyc 10V 47μF	1
D 1101	HDS0476	Diode S5566J	1
D 1102	HDS0476	Diode S5566J	1
D 1103	HDS0476	Diode S5566J	1
D 1104	HDS0476	Diode S5566J	1
D 1105	HDS0476	Diode S5566J	1
D 1106	HDS0476	Diode S5566J	1
D 1111	HDS0475	Diode S5566B	1
D 1112	HDS0475	Diode S5566B	1
D 1113	HDS0475	Diode S5566B	1
D 1114	HDS0475	Diode S5566B	1
IC 1111	ILH0109	IC, Analog HA17808P	1
IC 1121	ILM0342	IC, Analog μPC7908	1
IC 1131	ILH0108	IC, Analog HA17805P	1
P 1101	JBX0703	Connector 1-171825-0	1
R 1101	RCE0729	R, Carbon 1/2W 100kΩ ±5%	1
R 1102	RCE0425	R, Carbon 1/4W 1kΩ ±5%	1
R 1103	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 1104	RME1096	R, Metal 1/4W 100kΩ ±1%	1
R 1105	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1106	RME1086	R, Metal 1/4W 15.0kΩ ±1%	1
R 1107	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 1109	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 1110	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 1111	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 1121	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 1124	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1
R 1125	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 1141	RCE0800	R, Carbon 1/4W 470kΩ ±5%	1
R 1142	RCE0787	R, Carbon 1/4W 33kΩ ±5%	1
TR 1101	HTA0104	Transistor 2SA778A K	1
TR 1102	HTC0671	Transistor 2SC1505L	1
TR 1103	HTA0224	Transistor 2SA1029 D	1
TR 1104	HTC0148	Transistor 2SC458-C-	1

PB-14 (PEF-626) CRT (20 MHz)

Symbol	Part Code	Description	Q'ty
J 1001	8390152	Socket 1339	1
P 1031	JBB0021	Connector B3B-XH-A	1
P 1032	JBB0021	Connector B3B-XH-A	1
P 1035	JBB0021	Connector B3B-XH-A	1
R 1018	RCE0738	R, Carbon 1/2W 2.2MΩ ±5%	1
R 1030	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1031	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1

PB-15 (PEF-623) SCALE-LAMP

Symbol	Part Code	Description	Q'ty
PL 1401	8400068	Lamp 4W-8 (8V 0.12A)	1
PL 1402	8400068	Lamp 4W-8 (8V 0.12A)	1
PL 1403	8400068	Lamp 4W-8 (8V 0.12A)	1

⑨ RV & PREAMP

PB-15 (PEF-625) FOCUS + ILLUM + INTEN

Symbol	Part Code	Description	Q'ty
D 1310	HDS0437	Diode 1SS133	1
R 932	RCE0737	R, Carbon 1/2W 1.8MΩ ±5%	1
R 933	RMV0008	R, Metal VR37-15MΩJ	1
R 1019	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1
R 1301	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 1310	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1311	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 1312	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
RV 1301	8348452	VR, Carbon EVH-CCAK20B14 10kΩ	1
RV 1311	8348452	VR, Carbon EVH-CCAK20B14 10kΩ	1
RV 1401	RNE0059	VR, Metal EVM-NDG K20 B26	1
TR 1311	HTA0224	Transistor 2SA1029 D	1

⑩ ⑬ AD PREAMP

PEF-759 AD PRE AMP

Symbol	Part Code	Description	Q'ty
C1205-06	CCC1364	C, Ceramic 50V 330pF ±10%	2
C1108-09	CCC1030	C, Ceramic 50V 10000pF +80% −20%	2
C1222-23	CES0032	C, AL Elyc 25V 47μF ±20%	2
C1024-25	CCC1030	C, Ceramic 50V 10000pF +80% −20%	2
C1235-38	CCS0017	Capacitor SC45F1H104Z	4
C1239-42	CCC1030	C, Ceramic 50V 10000pF +80% −20%	4
C 1002	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 1004	CCC0997	C, Ceramic 50V 3pF ±0.25pF	1
C 1012	CCC0245	C, Ceramic 50V 100pF ±5%	1
C 1014	CES0213	C, AL Elyc 16V 10μF ±20%BP	1
C 1019	CQA0091	C, Plastic 50V 1000pF ±10%	1
C 1030	CCC1007	C, Ceramic 50V 22pF ±5%	1
C 1038	CES0032	C, AL Elyc 25V 47μF ±20%	1
C 1040	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 1110	CES0032	C, AL Elyc 25V 47μF ±20%	1
C 1112	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 1114	CCC1013	C, Ceramic 50V 39pF ±5%	1
C 1201	CCC0752	C, Ceramic 50V 220pF ±5%	1
C 1207	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 1218	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 1219	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
C 1220	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 1224	CCC1160	C, Ceramic 50V 330pF ±10%	1
C 1226	CCS0017	Capacitor SC45F1H104Z	1
C 1229	CQA0103	C, Plastic 50V 0.1μF ±10%	1
C 1234	CCC1030	C, Ceramic 50V 10000pF +80% −20%	1
D1225-26	HDS0437	Diode 1SS133	2
D1227-28	HDS0437	Diode 1SS133	2
D 1220	HDS0437	Diode 1SS133	1
D 1229	HDS0437	Diode 1SS133	1
IC 1001	ILT0043	IC,Analog TL082CP	1
IC 1201	IDH0630	IC,Digital HD74LS157P	1
IC 1202	IDH0802	IC, Digital HD14053BP	1
IC 1203	ILH0091	IC,Analog HA17458PS	1
IC 1204	IDH0999	IC, Digital HD74HC04P(TC74HC04P)	1
IC 1205	IDH0982	IC, Digital HD74HC00P(TC74HC00P)	1
IC 1206	IDH1004	IC, Digital HD74HC107P(TC74HC107P)	1
IC 1208	ILH0091	IC,Analog HA17458PS	1
IC 1209	IDH0802	IC, Digital HD14053BP	1
L 1201	TLF0019	Coil FL5H 33μH ±10%	1
P 1001	JBB0058	Connector B12B-XH-A	1
P 1201	JBB0021	Connector B3B-XH-A	1
P 1203	JBB0022	Connector B6B-XH-A	1
P 1204	JBB0026	Connector B10B-XH-A	1
P 1205	JBB0022	Connector B6B-XH-A	1
R1101-02	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	2
R1103-04	RCE0757	R, Carbon 1/4W 100Ω ±5%	2
R1201-04	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	4
R1205-06	RME1117	R, Metal 1/4W 750Ω ±1%	2
R1005-06	RCE0772	R, Carbon 1/4W 1.8kΩ ±5%	2
R1106-07	RCE0767	R, Carbon 1/4W 680Ω ±5%	2
R1108-09	RCE0749	R, Carbon 1/4W 22Ω ±5%	2
R1209-10	RME1077	R, Metal 1/4W 2.67kΩ ±1%	2
R1110-11	RCE0781	R, Carbon 1/4W 10kΩ ±5%	2
R1015-16	RCE0768	R, Carbon 1/4W 820Ω ±5%	2
R1017-18	RME1107	R, Metal 1/4W 86.6Ω ±1%	2
R1020-21	RCE0757	R, Carbon 1/4W 100Ω ±5%	2
R1022-23	RCE0767	R, Carbon 1/4W 680Ω ±5%	2

Symbol	Part Code	Description	Q'ty
R1222-23	RCE0749	R, Carbon 1/4W 22Ω ±5%	2
R1024-25	RCE0749	R, Carbon 1/4W 22Ω ±5%	2
R1026-27	RCE0781	R, Carbon 1/4W 10kΩ ±5%	2
R 1001	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 1002	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 1003	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1
R 1004	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 1007	RME1075	R, Metal 1/4W 1.82kΩ ±1%	1
R 1008	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 1009	RCE0763	R, Carbon 1/4W 330Ω ±5%	1
R 1010	RME1074	R, Metal 1/4W 1.50kΩ ±1%	1
R 1011	RME1064	R, Metal 1/4W 221Ω ±1%	1
R 1012	RCE0782	R, Carbon 1/4W 12kΩ ±5%	1
R 1013	RME1064	R, Metal 1/4W 221Ω ±1%	1
R 1014	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 1019	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 1028	RCE0790	R, Carbon 1/4W 56kΩ ±5%	1
R 1029	RCE0798	R, Carbon 1/4W 330kΩ ±5%	1
R 1030	RCE0782	R, Carbon 1/4W 12kΩ ±5%	1
R 1105	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1112	RCE0790	R, Carbon 1/4W 56kΩ ±5%	1
R 1113	RCE0798	R, Carbon 1/4W 330kΩ ±5%	1
R 1114	RCE0782	R, Carbon 1/4W 12kΩ ±5%	1
R 1207	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 1211	RME1070	R, Metal 1/4W 681Ω ±1%	1
R 1212	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 1213	RCE0759	R, Carbon 1/4W 150Ω ±5%	1
R 1214	RCE0758	R, Carbon 1/4W 120Ω ±5%	1
R 1215	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 1216	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 1217	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1218	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 1219	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1220	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
R 1221	RME1080	R, Metal 1/4W 4.75kΩ ±1%	1
R 1224	RCE0821	R, Carbon 1/4W 6.2kΩ ±5%	1
R 1225	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1226	RCE0784	R, Carbon 1/4W 18kΩ ±5%	1
R 1227	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1228	RCE0859	R, Carbon 1/4W 7.5kΩ +5%	1
R 1229	RCE0780	R, Carbon 1/4W 8.2kΩ ±5%	1
R 1230	RCE0768	R, Carbon 1/4W 820Ω ±5%	1
R 1231	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1232	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 1233	RME1503	R, Metal 1/4W 16.5kΩ +1%	1
R 1234	RME1082	R, Metal 1/4W 6.81kΩ ±1%	1
R 1235	RME1076	R, Metal 1/4W 2.21kΩ ±1%	1
R 1236	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 1237	RME1503	R, Metal 1/4W 16.5kΩ +1%	1
R 1238	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 1239	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 1240	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 1241	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 1242	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 1243	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 1244	RCE0804	R, Carbon 1/4W 75Ω ±5%	1
R 1245	RCE0804	R, Carbon 1/4W 75Ω ±5%	1
R 1246	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 1247	RCE0757	R, Carbon 1/4W 100Ω ±5%	1
R 1249	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 1250	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 1251	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 1252	RCE0780	R, Carbon 1/4W 8.2kΩ ±5%	1

Symbol	Part Code	Description	Q'ty
R 1253	RCE0766	R, Carbon 1/4W 560Ω ±5%	1
R 1254	RCE0780	R, Carbon 1/4W 8.2kΩ ±5%	1
R 1255	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
R 1256	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1257	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1258	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1
R 1259	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1
R 1260	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 1261	RCE0765	R, Carbon 1/4W 470Ω ±5%	1
RV 1029	RNT0191	RV, Metal EVN-38C A00 B14 10kΩ	1
RV 1030	RNT0191	RV, Metal EVN-38C A00 B14 10kΩ	1
RV 1113	RNT0191	RV, Metal EVN-38C A00 B14 10kΩ	1
RV 1114	RNT0191	RV, Metal EVN-38C A00 B14 10kΩ	1
RV 1212	RNT0188	RV, Metal EVN-38C A00 B13 1kΩ	1
RV 1226	RNT0191	RV, Metal EVN-38C A00 B14 10kΩ	1
RV 1229	RNT0193	RV, Metal EVN-38C A00 B54 50kΩ	1
TR 1001	HTA0099	Transistor 2SA781K	1
TR 1002	HTA0099	Transistor 2SA781K	1
TR 1003	HTC0148	Transistor 2SC458-C-	1
TR 1004	HTC0148	Transistor 2SC458-C-	1
TR 1005	HTA0099	Transistor 2SA781K	1
TR 1006	HTA0099	Transistor 2SA781K	1
TR 1101	HTA0099	Transistor 2SA781K	1
TR 1102	HTA0099	Transistor 2SA781K	1
TR 1103	HTA0099	Transistor 2SA781K	1
TR 1104	HTA0099	Transistor 2SA781K	1
TR 1201	HTA0099	Transistor 2SA781K	1
TR 1202	HTA0099	Transistor 2SA781K	1
TR 1203	HTA0099	Transistor 2SA781K	1
TR 1204	HTA0099	Transistor 2SA781K	1
TR 1205	HTC0338	Transistor 2SC1906	1
TR 1206	HTC0338	Transistor 2SC1906	1
TR 1207	HTC0148	Transistor 2SC458-C-	1
TR 1208	HTC0148	Transistor 2SC458-C-	1
TR 1209	HTA0224	Transistor 2SA1029 D	1
TR 1210	HTC0148	Transistor 2SC458-C-	1
TR 1211	HTA0224	Transistor 2SA1029 D	1
TR 1212	HTC0148	Transistor 2SC458-C-	1
TR 1213	HTA0224	Transistor 2SA1029 D	1
R 1262	RCE0785	R,Carbon 1/4W 22kΩ +5%	1
R1259-60	HDS0437	Diode 1SS133	2

PEF-758 CONTROL

Symbol	Part Code	Description	Q'ty
1A	IDH0881	IC, Digital HM6264P-15	1
1D	IDL0016	IC, Digital LH0083A	1
1G	IDM0445	IC, Digital μPD780C-1	1
1H	IDH1005	IC, Digital HD74HC138P (TC74HC138P)	1
1J	ILT0037	IC, Analog TL081CP	1
1K	ILH0091	IC, Analog HA17458PS	1
2H	ILH0123	IC, Analog HA17408P	1
3A	IDH0965	IC, Digital HN4827128G-25	1
3A	IYX0041	IC, Socket 10628-01-445	1
3D	IDL0015	IC, Digital LH0082A	1
3E	IDH1059	IC, Digital HM6116ASP-15	1
3F	IDH1011	IC, Digital HD74HC374P (TC74HC374P)	1
4B	IDH1057	IC, Digital HD74HC393P	1
4D	IDL0015	IC, Digital LH0082A	1
4E	IDH1009	IC, Digital HD74HC244P (TC74HC244P)	1
4G	IDH1011	IC, Digital HD74HC374P (TC74HC374P)	1
4K	IZM0131	IC, Hybrid MP7683	1
5A	IDH0999	IC, Digital HD74HC04P (TC74HC04P)	1
5B	IDH0982	IC, Digital HD74HC00P (TC74HC00P)	1
5E	IDH1056	IC, Digital HD74HC245P	1
5G	IDH1059	IC, Digital HM6116ASP-15	1
5H	IDH1003	IC, Digital HD74HC32P (TC74HC32P)	1
5J	IDH0999	IC, Digital HD74HC04P (TC74HC04P)	1
5K	IDH1003	IC, Digital HD74HC32P (TC74HC32P)	1
6A	IDH1005	IC, Digital HD74HC138P (TC74HC138P)	1
6C	IDH1009	IC, Digital HD74HC244P (TC74HC244P)	1
6D	IDH1055	IC, Digital HD74HC240P	1
6E	IDH0985	IC, Digital HD74HC273P (TC74HC273P)	1
6F	IDH0982	IC, Digital HD74HC00P (TC74HC00P)	1
6K	IDH1005	IC, Digital HD74HC138P (TC74HC138P)	1
7A	IDH0998	IC, Digital HD74HC02P (TC74HC02P)	1
7B	IDH1051	IC, Digital HD74HC74P	1
7C	IDH1000	IC, Digital HD74HC08P (TC74HC08P)	1
7D	IDH1009	IC, Digital HD74HC244P (TC74HC244P)	1
7E	IDH0985	IC, Digital HD74HC273P (TC74HC273P)	1
7F	IDH1051	IC, Digital HD74HC74P	1
7G	IDH1016	IC, Digital HD74HC161P	1
7H	IDH1016	IC, Digital HD74HC161P	1
7J	IDH1016	IC, Digital HD74HC 161P	1
7K	IDH1058	IC, Digital HD74HC4040P	1
8K	IDH1051	IC, Digital HD74HC74P	1
4H	IZM0131	IC, Hybrid MP7683	1
6G,6H,6J	IDH1020	IC, Digital HD74HC157P	3
C1314-18	CCS0017	Capacitor 50V 100000pF +80 −20%	5
C1321-25	CCS0017	Capacitor 50V 100000pF +80 −20%	5
C1326-27	CES0032	C, AL Elyc 25V 47μF ±20%	2
C1328-29	CCC1030	C, Ceramic 50V 10000pF +80 −20%	2
C1330-31	CES0032	C, AL Elyc 25V 47μF ±20%	2

Symbol	Part Code	Description	Q'ty
C1332-33	CCC1030	C, Ceramic 50V 10000pF +80 −20%	2
C1354-69	CCC1030	C, Ceramic 50V 10000pF +80 −20%	16
C 1301	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 1304	CCC0752	C, Ceramic 50V 220pF ±5%	1
C 1306	CCC1364	C, Ceramic 50V 330pF ±10%	1
C 1307	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 1307A	CCC1014	C, Ceramic 50V 47pF ±5%	1
C 1308	CES0032	C, AL Elyc 25V 47μF ±5%	1
C 1308A	CCC1014	C, Ceramic 50V 47pF ±5%	1
C 1309	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 1310	CES0032	C, AL Elyc 25V 47μF ±20%	1
C 1311	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 1312	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 1313	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 1319	CES0028	C, AL Elyc 10V 47μF ±20%	1
C 1320	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 1334	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
C 1350	CES0033	C, AL Elyc 25V 100μF ±20%	1
C 1351	CES0033	C, AL Elyc 25V 100μF ±20%	1
C 1352	CES0033	C, AL Elyc 25V 100μF ±20%	1
C 1353	CES0033	C, AL Elyc 25V 100μF ±20%	1
C 1373	CCC1030	C, Ceramic 50V 10000pF +80 −20%	1
D 1302	HDS0437	Diode 1SS133	1
D 1305	HDS0437	Diode 1SS133	1
P1307-08	JBB0022	Connector B6B-XH-A	2
P 1301	JBB0021	Connector B3B-XH-A	1
P 1302	JBB0060	Connector B5B-XH-A	1
P 1303	JBX1946	Connector 3431-2002SC	1
P 1304	JBB0021	Connector B3B-XH-A	1
P 1305	JBB0058	Connector B12B-XH-A	1
P 1306	JBB0026	Connector B10B-XH-A	1
P 1310	JBB0022	Connector B6B-XH-A	1
P 1311	JBB0022	Connector B6B-XH-A	1
P 1312	JBB0022	Connector B6B-XH-A	1
R1302-03	RME1127	R, Metal 1/4W 6.19kΩ ±1%	2
R 1301	RCE0773	E, Carbon 1/4W 2.2kΩ ±5%	1
R 1304	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 1305	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R 1306	RCE0768	R, Carbon 1/4W 820Ω ±5%	1
R 1307	RCE0800	R, Carbon 1/4W 470kΩ ±5%	1
R 1311	RCE0763	R, Carbon 1/4W 330Ω ±5%	1
R 1312	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1
R 1313	RCE0761	R, Carbon 1/4W 220Ω ±5%	1
RM 1301	RZA0086	R,Block RKC 1/8 B8 10kΩJ	1
RM 1302	RZA0086	R,Block RKC 1/8 B8 10kΩJ	1
RM 1303	RZA0086	R,Block RKC 1/8 B8 10kΩJ	1
RM 1304	RZA0086	R,Block RKC 1/8 B8 10kΩJ	1
RM 1305	RZA0086	R,Block RKC 1/8 B8 10kΩJ	1
RM 1306	RZA0086	R,Block RKC 1/8 B8 10kΩJ	1
RM 1307	RZA0086	R,Block RKC 1/8 B8 10kΩJ	1
RV 1301	RNT0187	RV, Metal EVN-38C A00 B52 500Ω	1
RV 1304	RNT0187	RV, Metal EVN-38C A00 B52 500Ω	1
X 1	EZZ0081	OSC, Cer CSA 8.00MT	1

PEF-766 TIME/DIV READ

Symbol	Part Code	Description	Q'ty
P 1601	JBB0022	Connector B6B-XH-A	1

⟨14⟩ PRE TRIG SW

PEF-764 PRE TRIG SW

Symbol	Part Code	Description	Q'ty
P 1504	JBB0060	Connector B5B-XH-A	1
S 1506	SSR0305	SW, Rotary SBM1014S	1

PEF-762 KEY SW

Symbol	Part Code	Description	Q'ty
S1501-05	SSB0006	SW KHJ11901 (With 86H3P)	5

PEF-763 KEY SW

Symbol	Part Code	Description	Q'ty
C 1501	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1
C 1502	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1
D 1501	HDS0437	Diode 1SS133	1
IC 1501	IDH1011	IC, Digital HD74HC374P (TC74HC374P)	1
IC 1502	IDH1019	IC, Digital HD74HC32P	1
IC 1503	IDH1000	IC, Digital HD74HC08P (TC74HC08P)	1
IC 1504	IDH0999	IC, Digital HD74HC04P (TC74HC04P)	1
	JBX0250	Connector 1-163740-5	1
R 1501	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R1503-04	RCE0766	R, Carbon 1/4W 560Ω ±5%	2
RM 1501	RZA0086	R, Block RKC 1/8 B8 10kΩJ	1

⑮ ⑯ PROT OUT

PEF-760 PLOT OUT

Symbol	Part Code	Description	Q'ty
1A	IDH1053	IC, Digital HD74HC125P	1
1C	IDH1051	IC, Digital HD74HC74P	1
1D	IDH0999	IC, Digital HD74HC04P (TC74HC04P)	1
1E	IDH1003	IC, Digital HD74HC32P (TC74HC32P)	1
2A	IDH1024	IC, Digital HD74HC123P (TC74HC123P)	1
2C	IDH1052	IC, Digital HD74HC14P	1
2D	IDS0392	IC, Digital TMS9914NL	1
2E	IDH1000	IC, Digital HD74HC08P (TC74HC08P)	1
2F	IDH1005	IC, Digital HD74HC138P (TC74HC138P)	1
2G	IDH0985	IC, Digital HD74HC273P (TC74HC273P)	1
2H	ILH0123	IC, Analog HA17408P	1
2J	ILH0091	IC, Analog HA17458PS	1
3A	IDH1009	IC, Digital HD74HC244P (TC74HC244P)	1
3B	IDS0413	IC, Digital SN75160AN	1
3C	IDS0391	IC, Digital SN75161N	1
3E	IDH1056	IC, Digital HD74HC245P	1
3F	IDH1054	IC, Digital HD74HC174P	1
3G	IDH0985	IC, Digital HD74HC273P (TC74HC273P)	1
3H	IZH0018	IC, Hybrid HA17012PB	1
C1409-10	CQA0097	C, Plastic 50V 10000pF ±10%	2
C1411-14	CES0032	C, AL Elyc 25V 47μF ±20%	4
C1415-18	CCC1030	C, Ceramic 50V 10000pF +80 -20%	4
C1421-22	CES0032	C, AL Elyc 25V 47μF ±20%	2
C1424-25	CES0101	C, AL Elyc 16V 10μF	2
C1428-29	CES0033	C, AL Elyc 25V 100μF ±20%	2
C1430-31	CES0033	C, AL Elyc 25V 100μF ±20%	2
C1432-35	CCC1030	C, Ceramic 50V 10000pF +80 -20%	4
C1436-50	CCC1030	C, Ceramic 50V 10000pF +80 -20%	15
C 1419	CCC0245	C, Ceramic 50V 100pF ±5%	1
C 1420	CCC1015	C, Ceramic 50V 56pF ±5%	1
C 1423	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1
C 1426	CES0036	C, AL Elyc 25V 22μF ±20%	1
C 1427	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1
C 5829	CES0033	C, AL Elyc 25V 100μF ±20%	1
D 1426	HDS0437	Diode 1SS133	1
P 1401	JBX0028	Connector 3402-0000 (34)	1
P 1401A	JBX0701	Connector 3414-6000	1
P 1402	JBB0022	Connector B6B-XH-A	1
P 1403	JBX0472	Connector 3429-2002LC (26P)	1
R1401-04	RME1078	R, Metal 1/4W 3.32kΩ ±1%	4
R1405-08	RME1073	R, Metal 1/4W 1.21kΩ ±1%	4
R1409-10	RME1079	R, Metal 1/4W 3.92kΩ ±1%	2
R1412-13	RCE0757	R, Carbon 1/4W 100Ω ±5%	2
R 1411	RME1073	R, Metal 1/4W 1.21kΩ ±1%	1
R 1414	RCE0749	R, Carbon 1/4W 22Ω ±5%	1
R 1415	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 1416	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1
R 1424	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1
R 1425	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1
R 1426	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1
R 1427	RCE0753	R, Carbon 1/4W 47Ω ±5%	1
R5816-21	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	6
R 5823	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1
R 5829	RCE0769	R, Carbon 1/4W 1.0kΩ ±5%	1

Symbol	Part Code	Description	Q'ty
R 6014	RCE0819	R, Carbon 1/4W 5kΩ ±5%	1
R 6016	RCE0821	R, Carbon 1/4W 6.2kΩ ±5%	1
RM 1401	RZA0117	R, Block RKC 1/8B8 4.7kΩJ	1
RV 1409	RNT0189	RV, Metal EVN-38C A00 B23 2kΩ	1
RV 1410	RNT0189	RV, Metal EVN-38C A00 B23 2kΩ	1
S 1401	SSV0042	SW, Slide SSB023 L=9 NS PCB	1
S 1402	SSP0440	SW, PB SUJ1	1
S 1403	SSP0441	SW, PB SUJ1	1
TR 1401	HTC0148	Transistor 2SC458-C-	1

⑰ POWER

PEF-761 POWER

Symbol	Part Code	Description	Q'ty
C 1701	CES0137	C, AL Elyc 25V 2200μF ±20%	1
C 1702	CES0040	C, AL Elyc 50V 10μF ±20%	1
C 1703	CES0045	C, AL Elyc 35V 2200μF ±20%	1
C 1704	CES0040	C, AL Elyc 50V 10μF ±20%	1
C 1705	CES0045	C, AL Elyc 35V 2200μF ±20%	1
C 1706	CES0040	C, AL Elyc 50V 10μF ±20%	1
D 1701-4	HDD0158	Diode DSA3A1	4
D 1705	HDM0033	Diode Stack M4C-1	1
IC 1701	ILS0029	IC,Analog SI-3554M	1
IC 1702	8338426B	IC,Analog HA17812P	1
IC 1703	ILN0327	IC, Analog MPC7912H	1
P 1701	JBX1909	Connector 171826-5	1
F 1701	ELF0162	Fuse TSCR UL 125V 3.15A	1

⑱ GP-IB CONNECTOR

PEF-765 GP-IB connector

Symbol	Part Code	Description	Q'ty
J 1403	JBX1860	Connector 3399-6026S	1
J 5801	JBX0054	Cnnector 3434-0000(26pin)	1
P 5802	JMX0505	Connector 57-20240-8	1
S 5800	SSS0083	SW DSS106(DIP SW)	1

PANEL + OTHERS

Symbol	Part Code	Description	Q'ty
	8338351	Terminal Z-048(Earth)	1
	ERH0014	Tape Polyester No.56 W=12MM YEL.	R01
	BBA0337	Wire PVC UL-1007 #24 GRN	R5
	ERD0043	Tubing Irrax 0.7PH1 YEL	R1
	ERD0044	Tubing Irrax 1.0PH1 YEL	R1
	8363311A		R002
	BBE0044	Wire PVC UL-1007 #26 WHT	R5
	ERL0089	Cable Tie PLTIM-XMR	5
	BSA0031		R003
	VEA0002		R007
	8448318A	Cemedine High Super 5 Minute	R01
	ERI0010	Tape Scotch #29 20M/M	R008
	BMD0051	Magnetwire 2 BL-3 UEW 0.18	R1
	8402043	Connector For Rotation-Coil	1
	4044797E	Terminal C5	1
	ERL0093	Cable Tie SKB-4M	1
	BBA0201		R2
	BBA0341	Wire PVC UL-1007 #24 WHT	R2
	BBA1146	Wire, Vinyl UL-1015#22 7/0.26TA-SC WHT	R2
	BBA1145	Wire, Vinyl UL-1015#22 7/0.26TA-SC BLK	R5
	BSE0001	Wire DIA 0.75 TIN Plated	R1
D 1110	HDL0036	Diode LN21RPHL. HT	1
J 1	JHB0088	Coax. Con BNC071	1
J 5	JJT0035	Tip Jack TJ-10A Black	1
J 9	JHB0088	Coax. Con BNC071	1
J 80	JHB0088	Coax. Con BNC071	1
J 101	JHB0088	Coax. Con BNC071	1
J 403	JHB0088	Coax. Con BNC071	1
J1501-03	JHB0088	Coax. Con BNC071	3
J 1102	8455061		1
J 1201	8397022	Test Point Z069	1
S 1101	8400067	SW, PB SDV 3P (UL, CSA)	1
T 1101	8457572	XFMR S-179A	1
TR 1310	HTD0155	Transistor 2SD313E	1
V 1001	DPX0076	CRT 150BTB31 (IG)	1

CONNECTORS

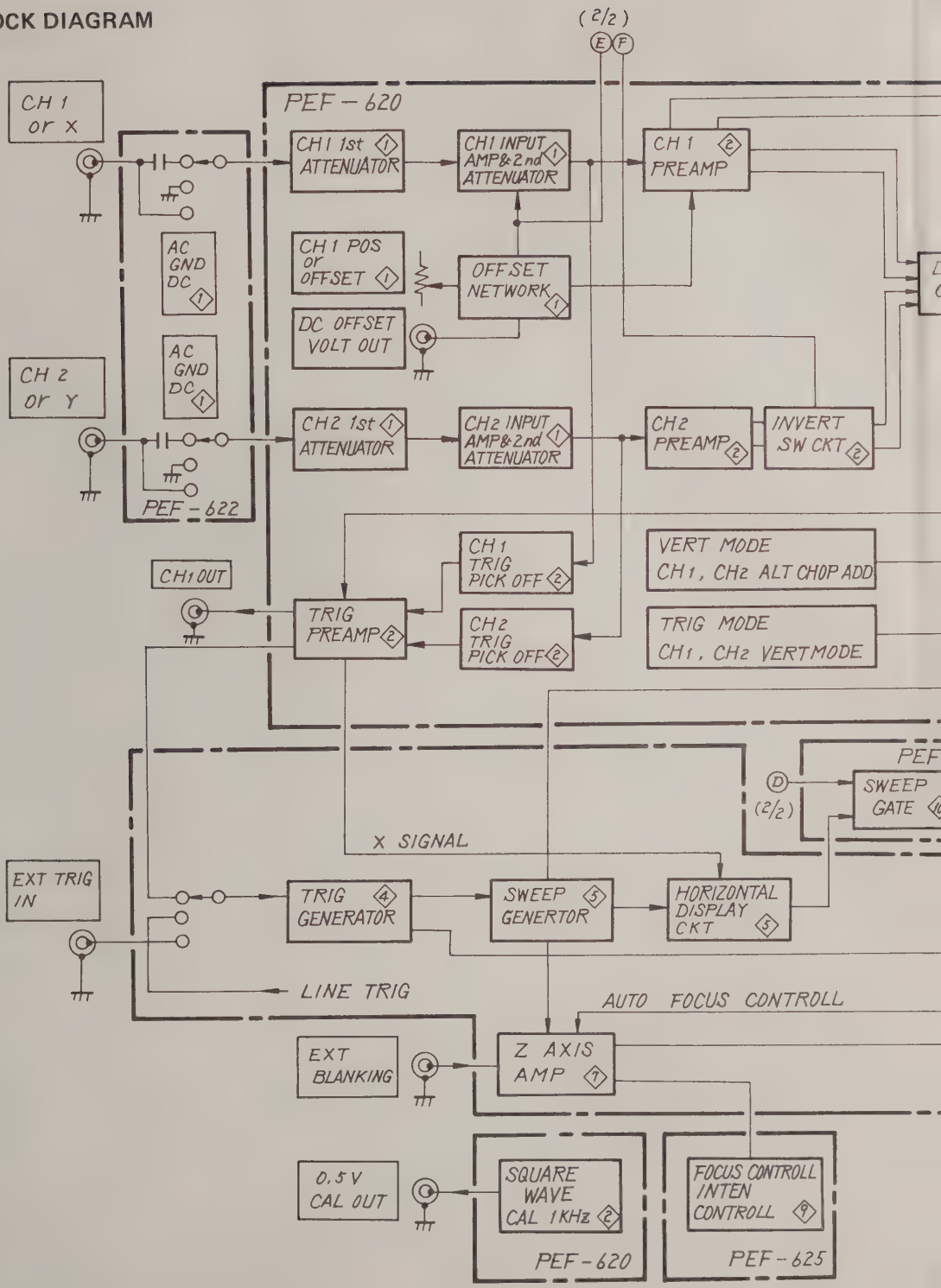
Symbol	Part Code	Description	Q'ty
P 2	JBB0021	Connector B3B-XH-A	1
P 3	JBB0022	Connector B6B-XH-A	1
P 50	JBB0021	Connector B3B-XH-A	1
P 90	JBB0021	Connector B3B-XH-A	1
P 102	JBB0021	Connector B3B-XH-A	1
P 202	JBB0021	Connector B3B-XH-A	1
P 203	JBB0021	Connector B3B-XH-A	1
P 302	JBB0022	Connector B6B-XH-A	1
P 304	JBB0021	Connector B3B-XH-A	1
P 1201	JBB0021	Connector B3B-XH-A	1
P 1206	JBB0021	Connector B3B-XH-A	1

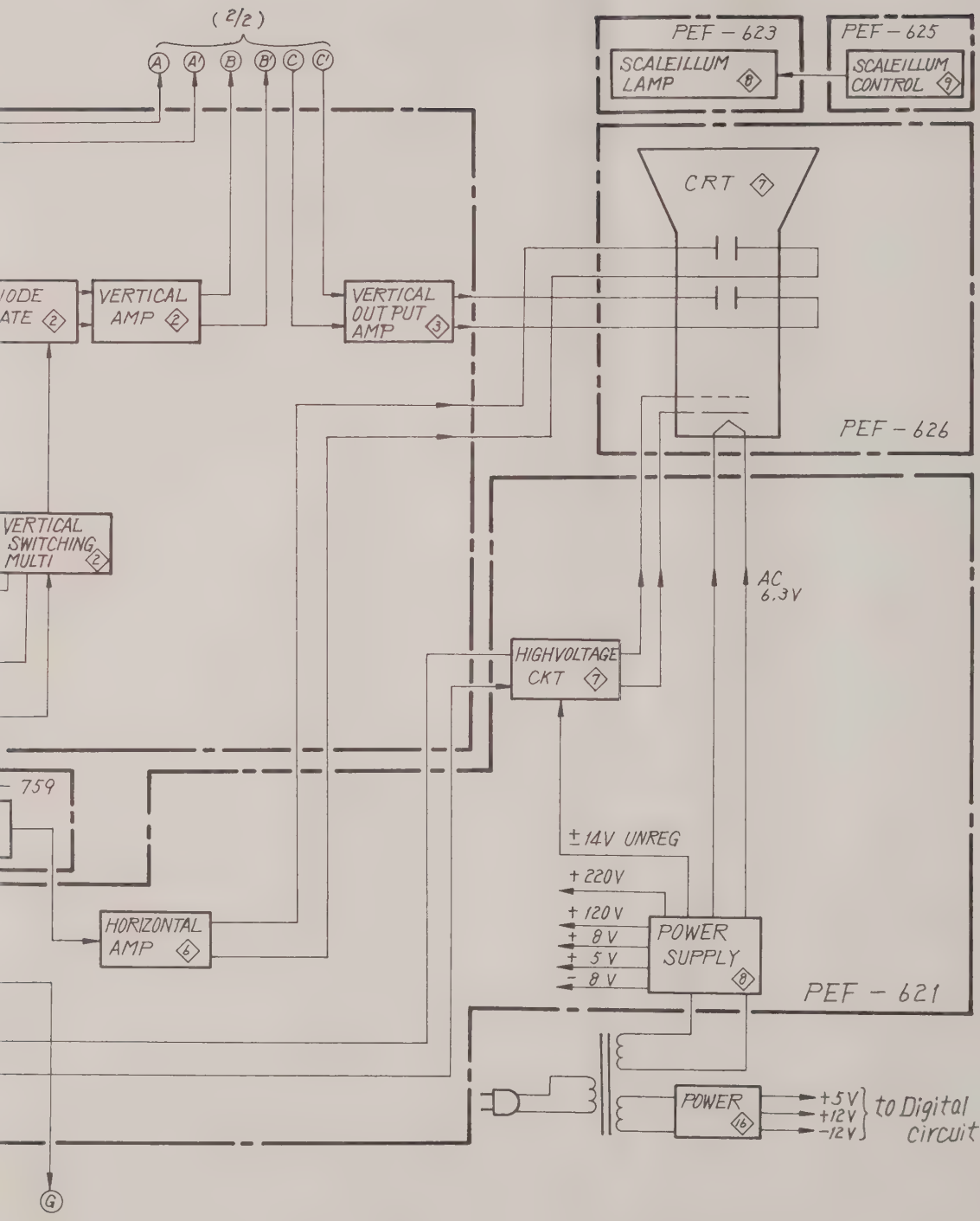
CONNECTORS

Symbol	Part Code	Description	Q'ty
P 404	JBB0021	Connector B3B-XH-A	1
P 901	JBB0021	Connector B3B-XH-A	1
P 902	JBB0021	Connector B3B-XH-A	1
P 1001	JBB0021	Connector B3B-XH-A	1
P 1002	JBB0021	Connector B3B-XH-A	1
P 1104	JBB0022	Connector B6B-XH-A	1
P 1301	JBB0021	Connector B3B-XH-A	1
P 1350	JBB0021	Connector B3B-XH-A	1

Symbol	Part Code	Description	Qty

8. BLOCK DIAGRAM





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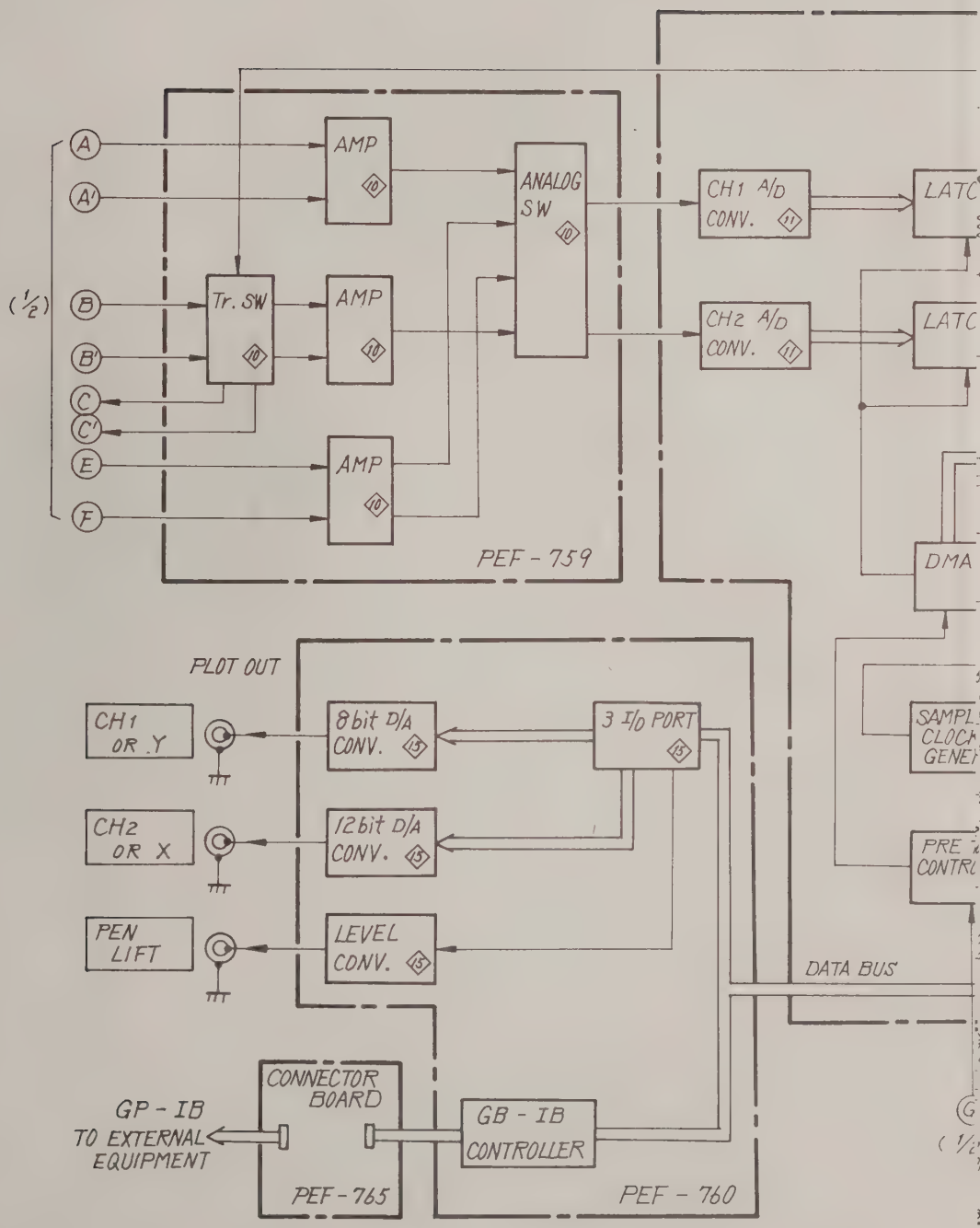
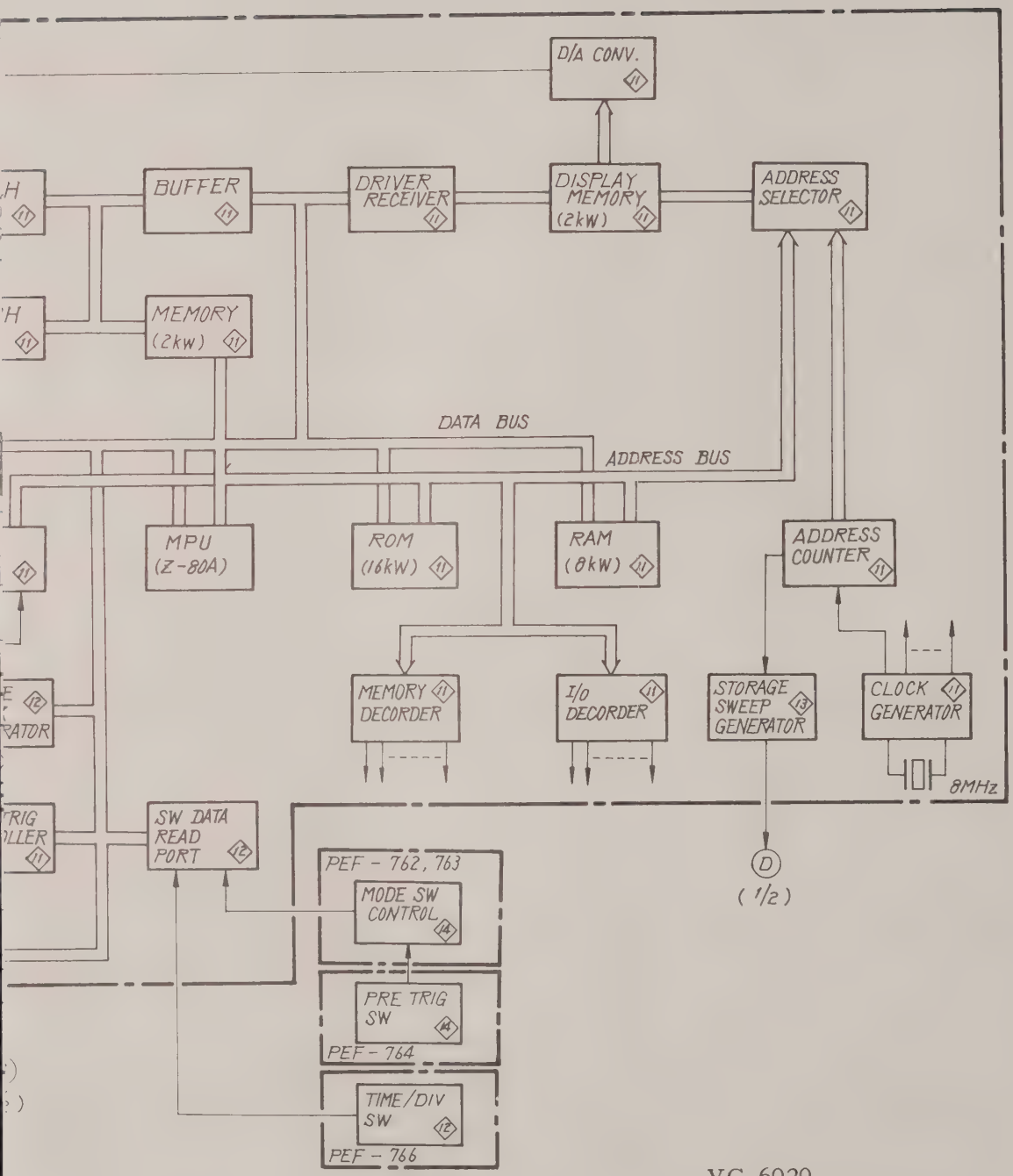
BLOCK DIAGRAM (1/2)


A
A'
(1/2)
B
B'
C
C'
E
F
AMP
Tr. SW
AMP
AMP
ANALOG SW
PEF - 759
CH1 A/D CONV.
CH2 A/D CONV.
LATC
LATC
DMA
PLOT OUT
CH1 OR Y
CH2 OR X
PEN LIFT
8 bit D/A CONV.
12 bit D/A CONV.
LEVEL CONV.
3 I/O PORT
DATA BUS
CONNECTOR BOARD
GP - IB TO EXTERNAL EQUIPMENT
GB - IB CONTROLLER
PEF - 765
PEF - 760



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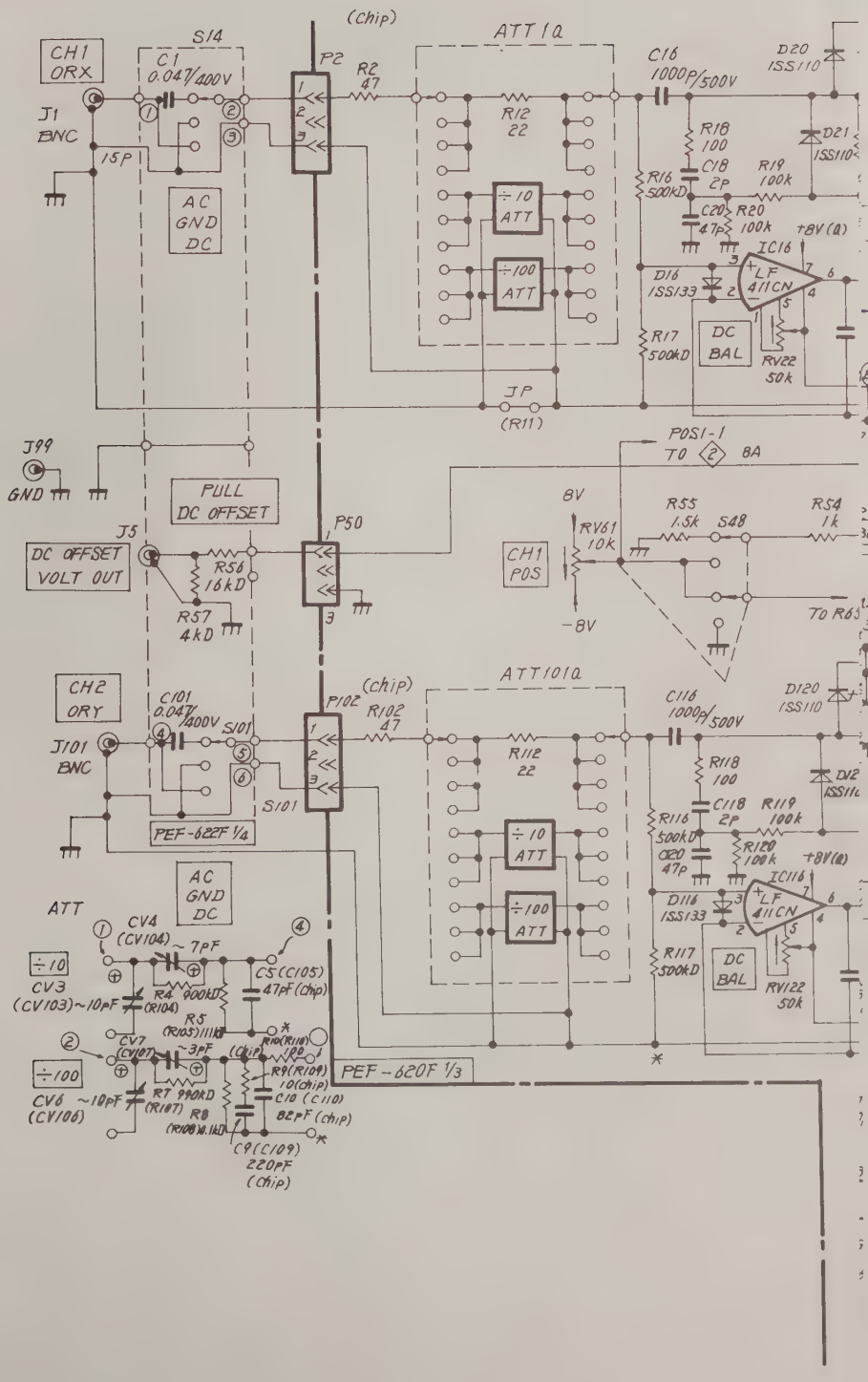
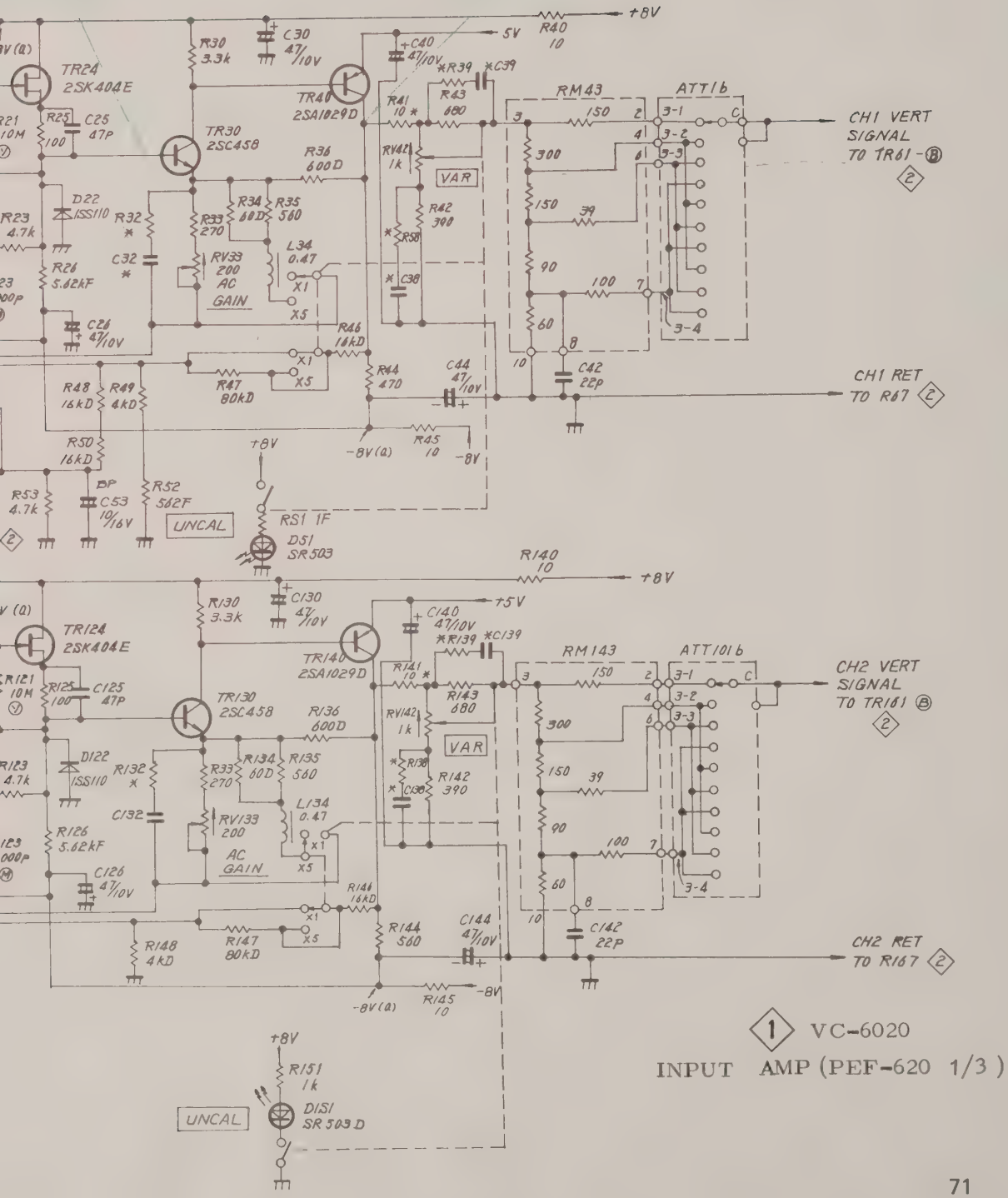
BLOCK DIAGRAM (2/2)

9. SCHEMATIC DIAGRAMS





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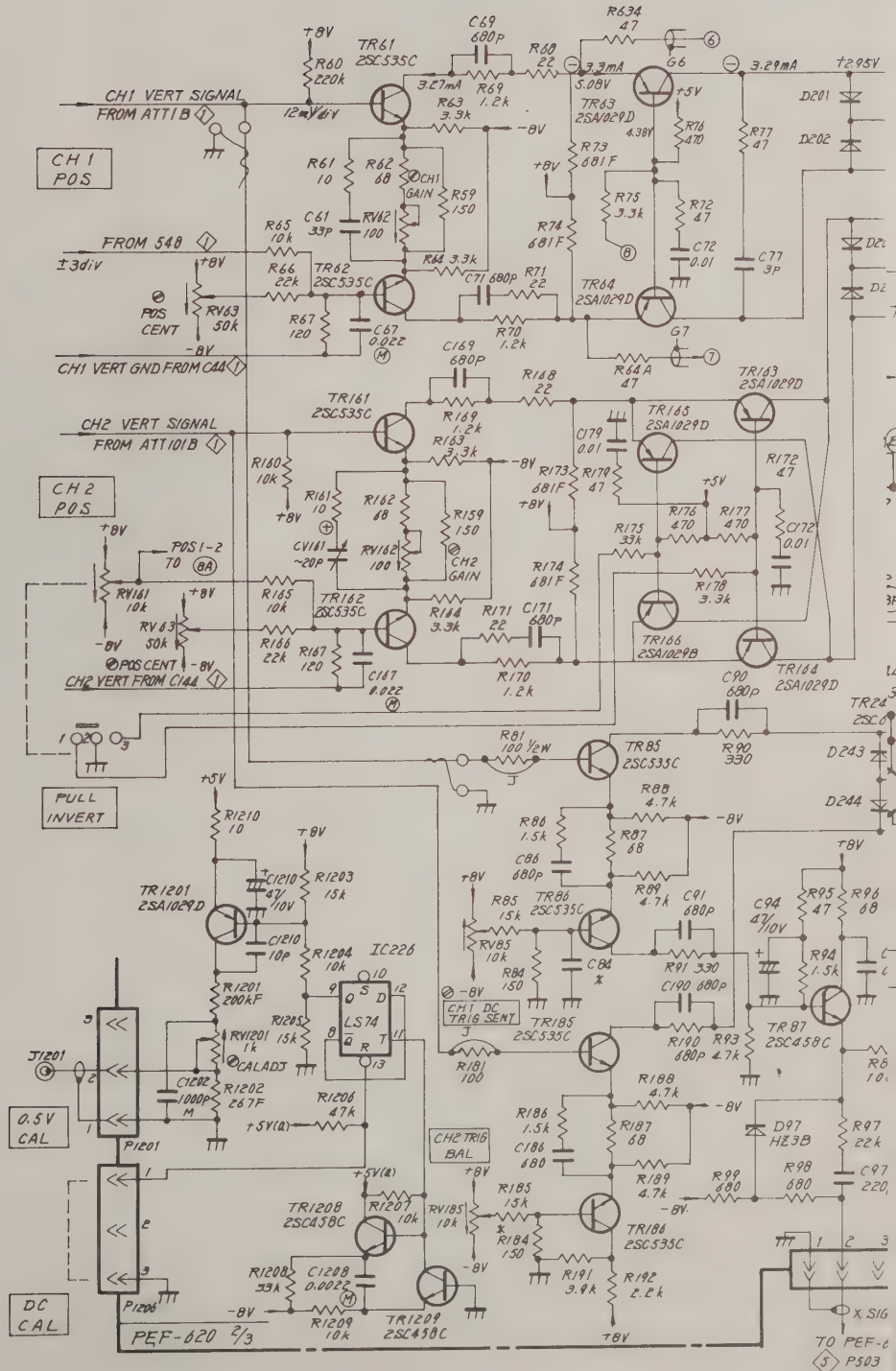
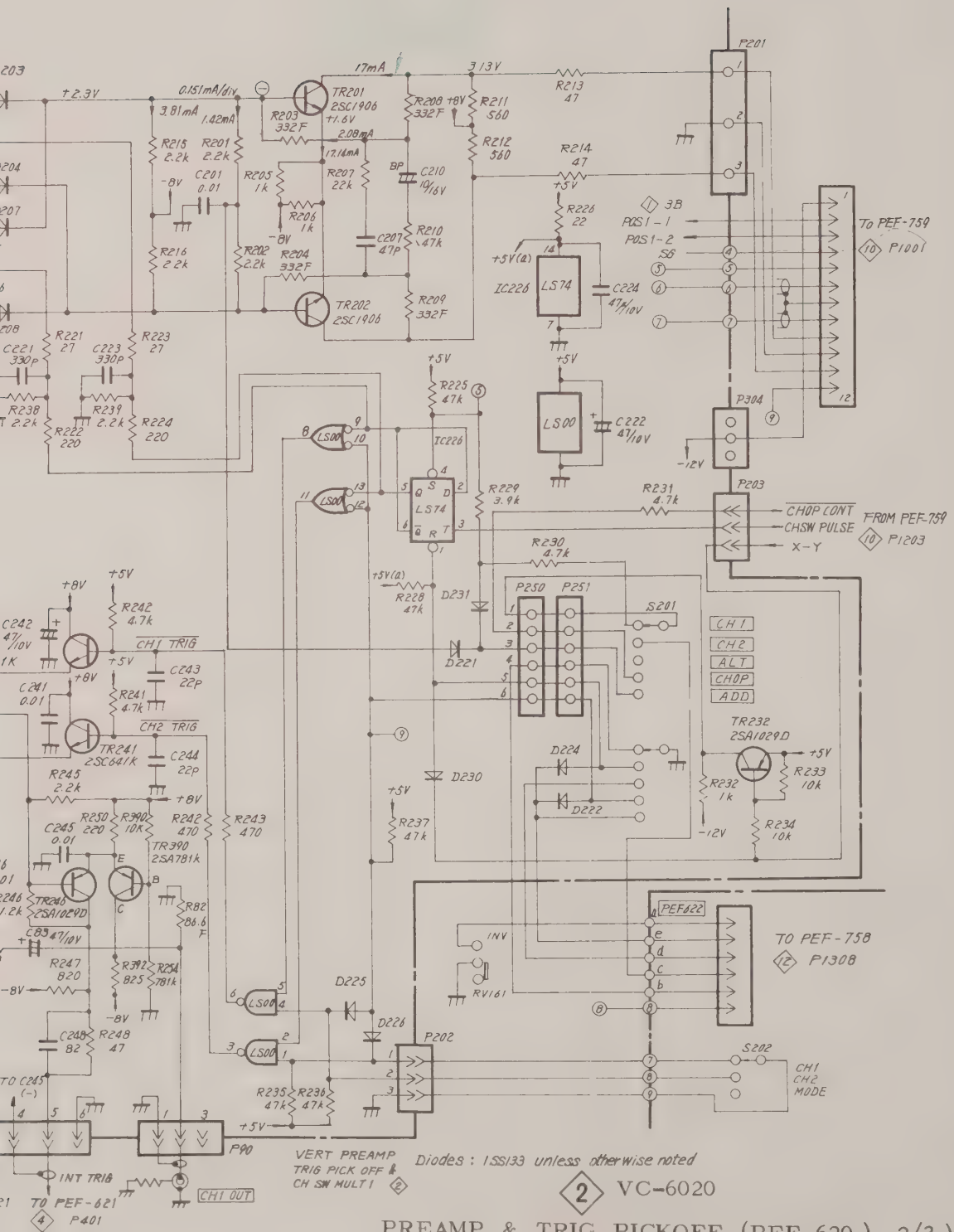
INPUT AMP (PEF-620 1/3)


CH1 VERT SIGNAL FROM ATT1B
CH1 POS
FROM 54B
±3div
POS CENT
CH1 VERT GND FROM C44
CH2 VERT SIGNAL FROM ATT101B
CH2 POS
POS1-2 TO 8A
POS CENT
CH2 VERT FROM C144
FULL INVERT
0.5V CAL
DC CAL
P1201
P1206
J1201
CH1 DC TRIG SEMI
CH2 TRIG BAL
CH1 GAIN
CH2 GAIN
CALADJ
IC226
LS74
TR61 2SC535C
TR62 2SC535C
TR63 2SA1029D
TR64 2SA1029D
TR161 2SC535C
TR162 2SC535C
TR163 2SA1029D
TR164 2SA1029D
TR165 2SA1029D
TR166 2SA1029B
TR85 2SC535C
TR86 2SC535C
TR185 2SC535C
TR186 2SC535C
TR87 2SC458C
TR1201 2SA1029D
TR1208 2SC458C
TR1209 2SC458C
D201
D202
D243
D244
D97 HZ3B
X SIG
TO PEF-6 P503
PEF-620 2/3



Diodes : 1SS133 unless otherwise noted

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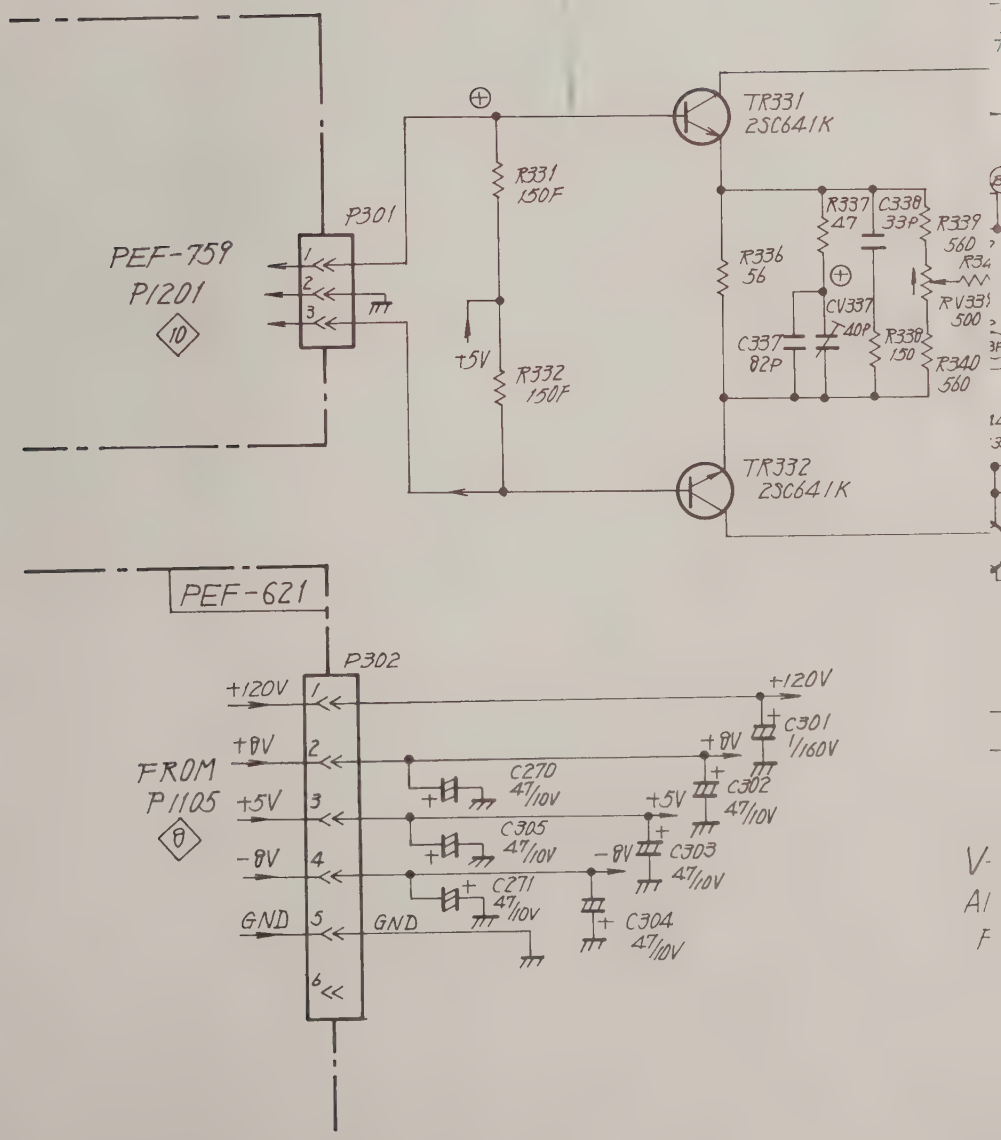
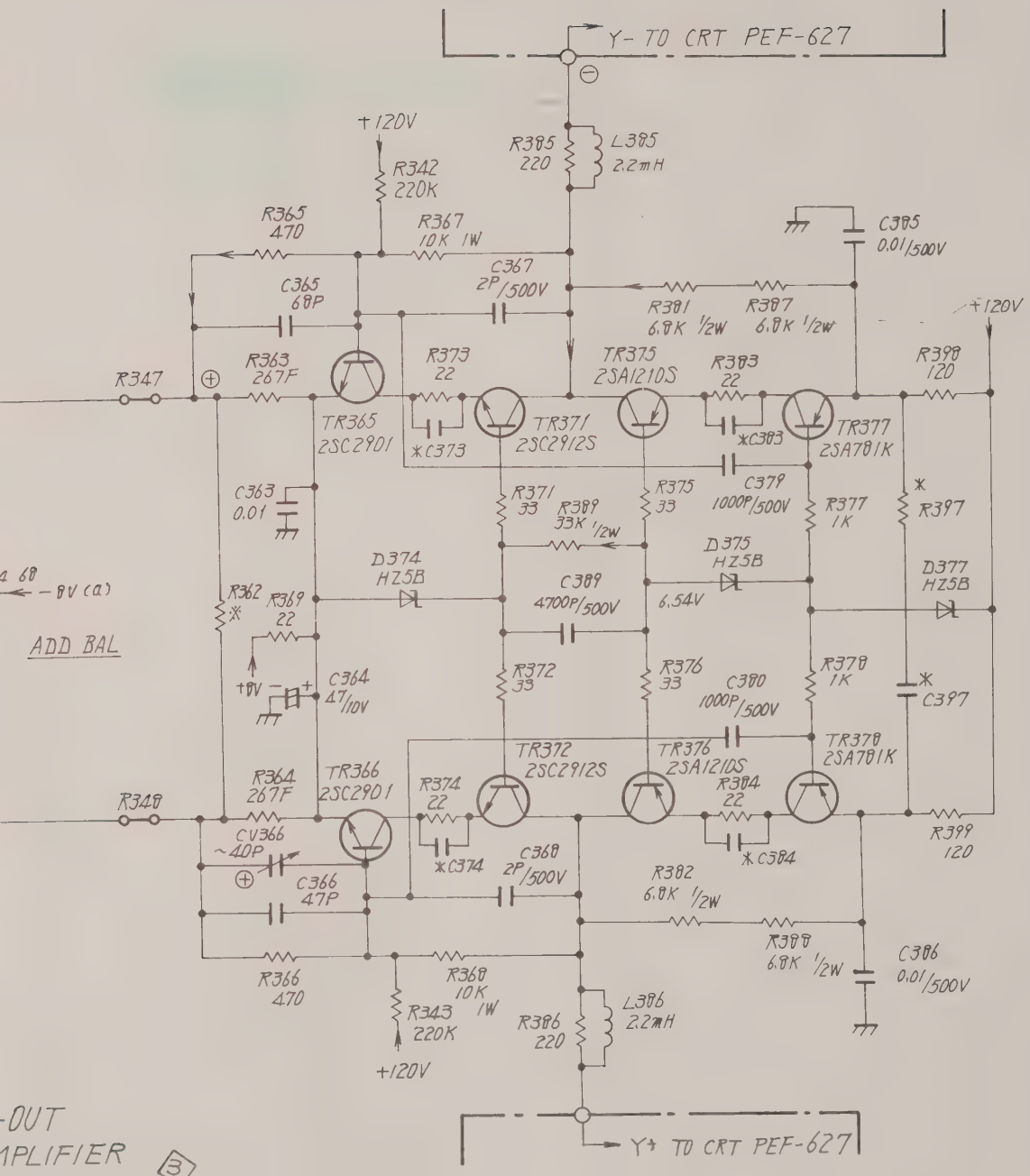
PREAMP & TRIG PICKOFF (PEF-620) 2/3)


PEF-759
P1201
10
P301
1
2
3
R331
150F
+5V
R332
150F
TR331
2SC641K
TR332
2SC641K
R336
56
R337
47
C338
33P
R339
560
CV337
40P
C337
82P
R338
150
R340
560
PEF-621
P302
FROM
P1105
8
+120V
+8V
+5V
-8V
GND
C270
47/10V
C305
47/10V
C271
47/10V
C301
1/160V
C302
47/10V
C303
47/10V
C304
47/10V



-OUT
MPLIFIER
EF-620

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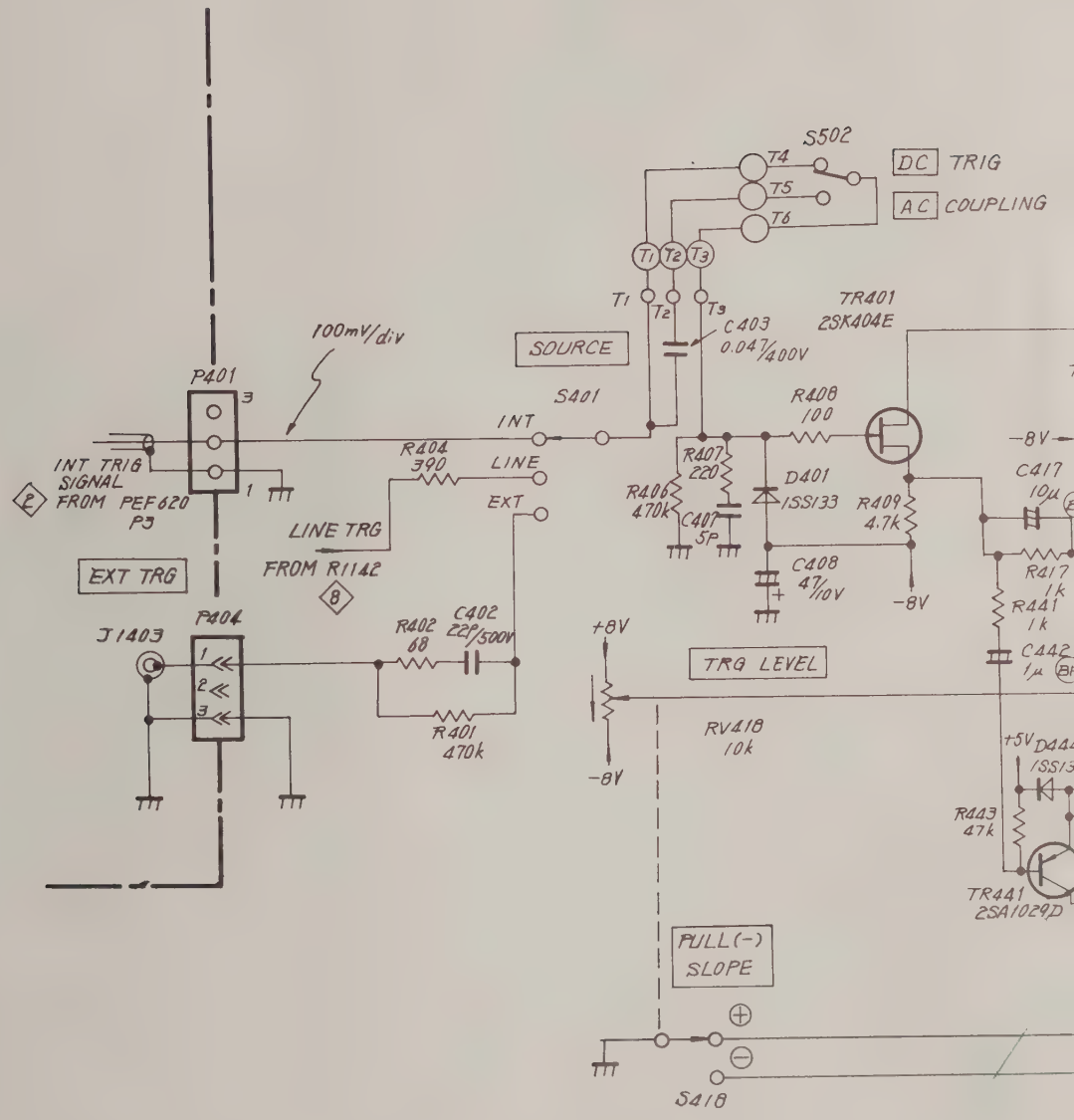
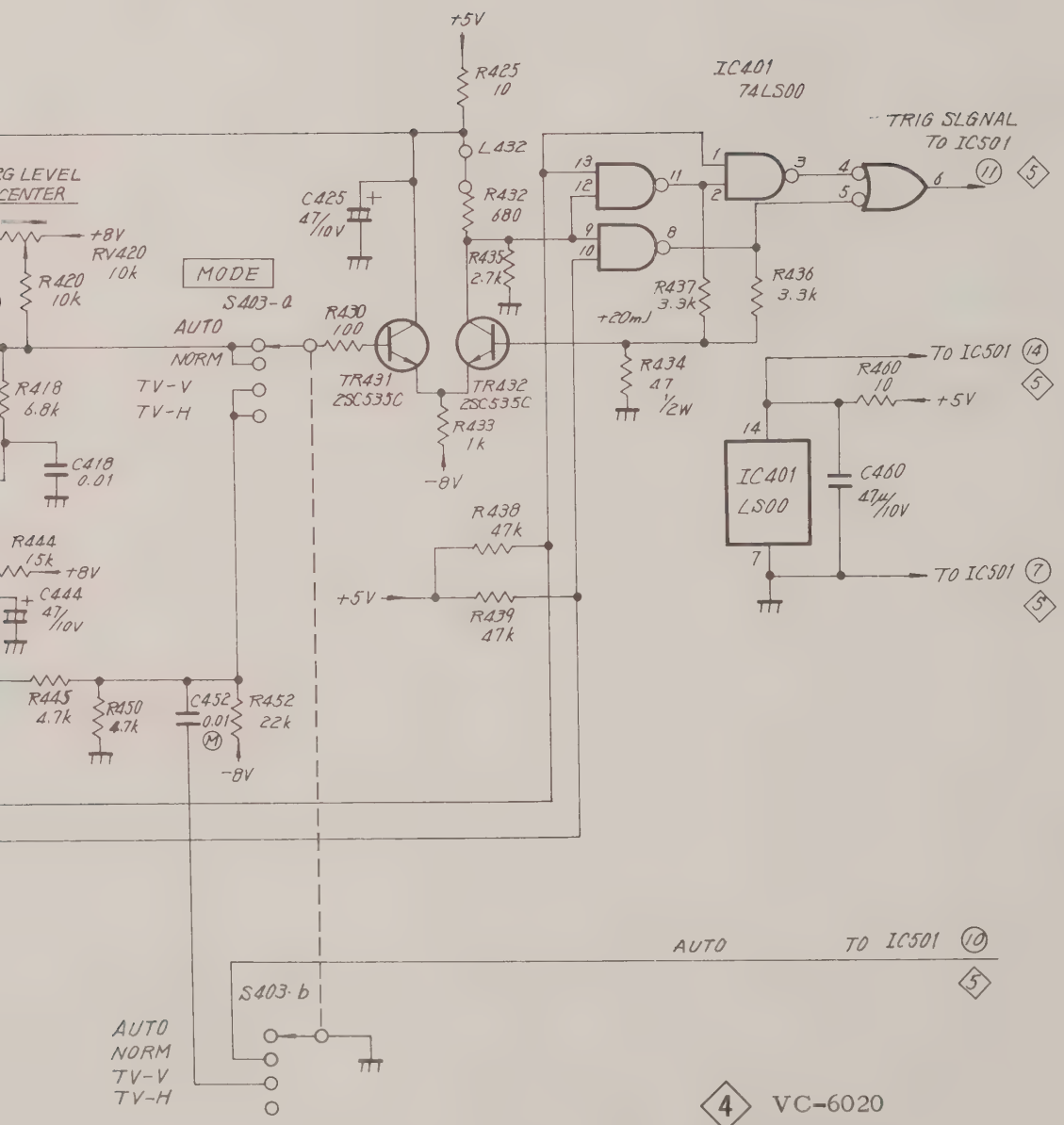
V OUT (PEF-620 3/3)


S502
T4
T5
T6
DC TRIG
AC COUPLING
T1
T2
T3
SOURCE
C403
0.047/400V
TR401
2SK404E
100mV/div
P401
S401
INT
R408
100
INT TRIG
SIGNAL
FROM PEF620
P3
R404
390
LINE
EXT
R407
220
R406
470k
C407
5P
D401
1SS133
R409
4.7k
-8V
C417
10μ
LINE TRG
FROM R1142
EXT TRG
C408
47/10V
R417
1k
R441
1k
C442
1μ
P404
J1403
R402
68
C402
222/500V
+8V
TRG LEVEL
R401
470k
RV418
10k
+5V
R443
47k
TR441
2SA1029D
PULL(-)
SLOPE
S418



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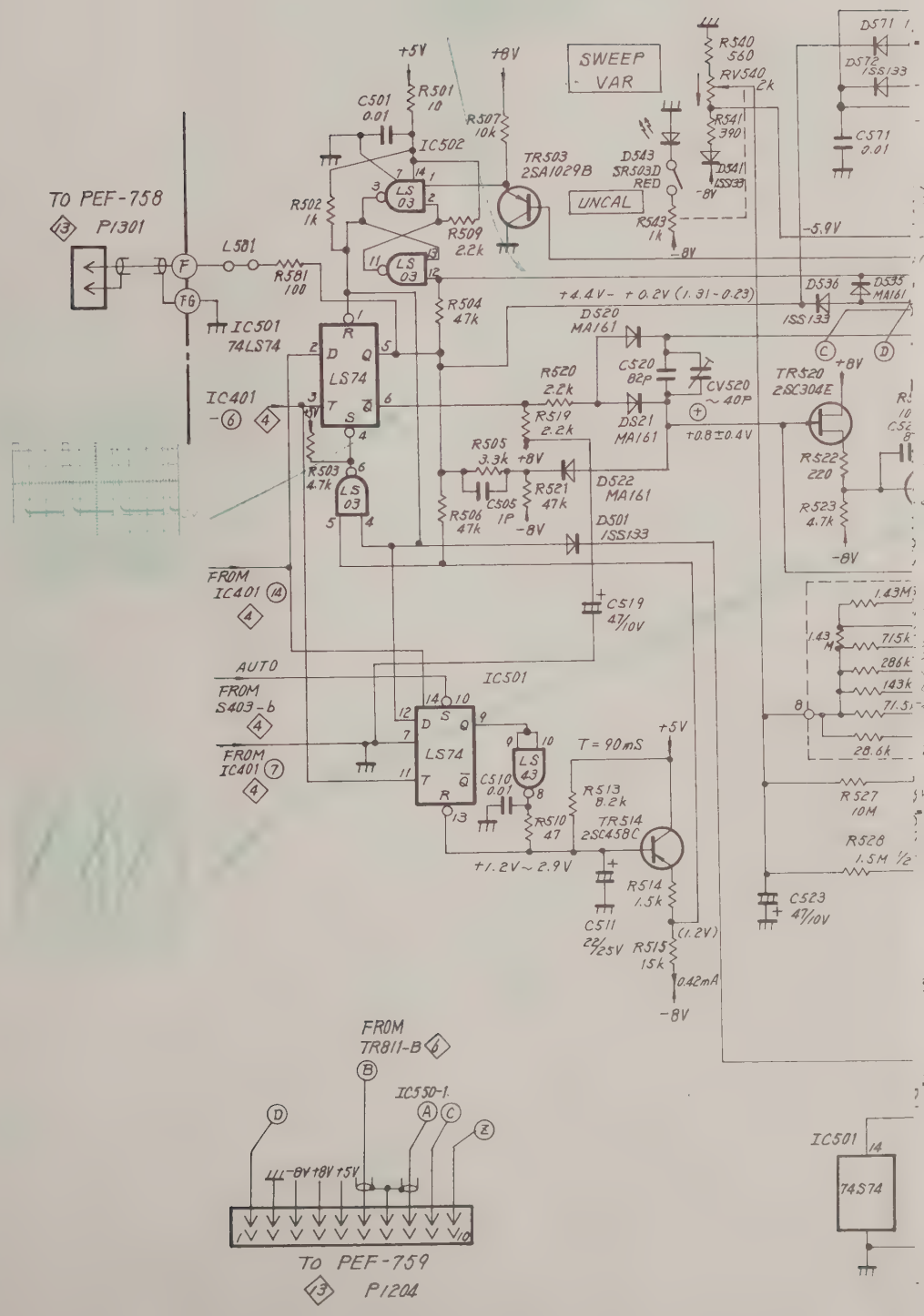
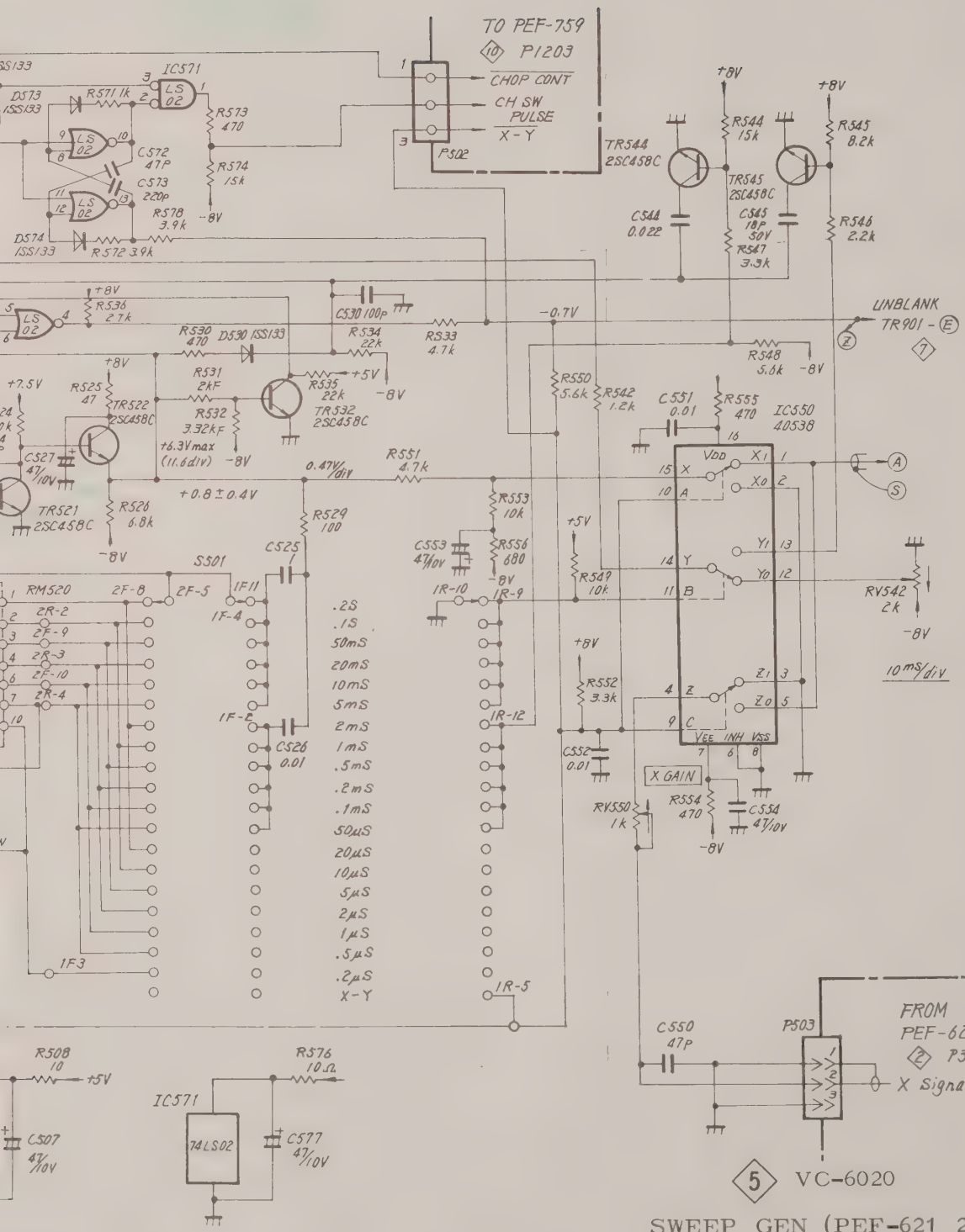
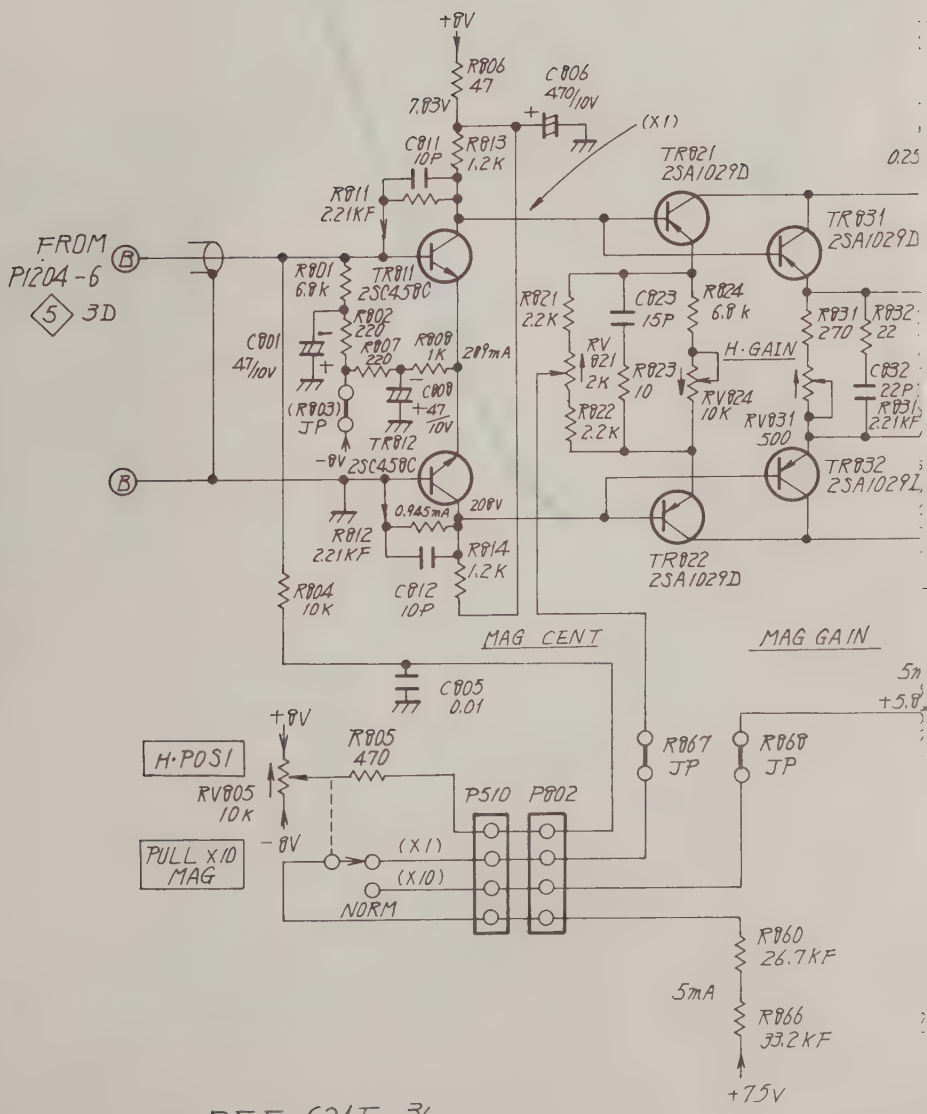
TRIG GEN (PEF-621 1/5)

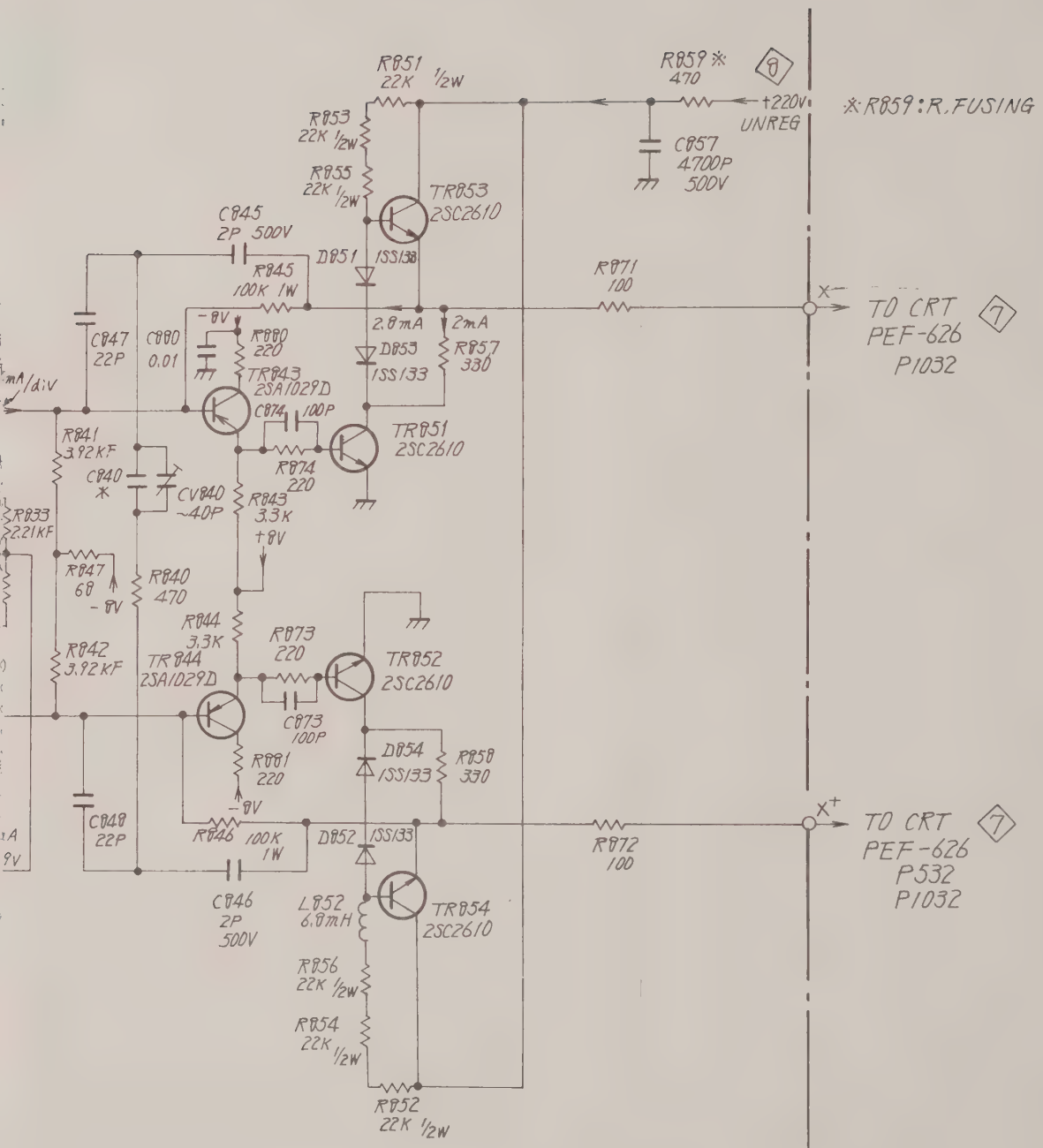

TO PEF-758
P1301
L501
R581 100
IC501 74LS74
IC401
FROM IC401
AUTO
FROM S403-b
FROM IC401
+5V
+8V
R501 10
C501 0.01
IC502
R507 10k
R502 1k
R509 2.2k
R504 47k
R503 4.7k
R505 3.3k
R506 47k
C505 1P
R521 47k
R519 2.2k
R520 2.2k
DS20 MA161
DS21 MA161
DS22 MA161
DS501 1SS133
C520 82P
CV520 ~40P
+0.8±0.4V
+4.4V~+0.2V (1.31-0.23)
C519 47/10V
IC501
T=90mS
C510 0.01
R510 47
R513 8.2k
TR514 2SC458C
+1.2V~2.9V
C511 22/25V
R514 1.5k
R515 15k
(1.2V)
0.42mA
-8V
SWEEP VAR
TR503 2SA1029B
D543 SR503D RED
UNCAL
R543 1k
R540 560
RV540 2k
R541 390
-5.9V
DS36 1SS133
DS35 MA161
TR520 2SC304E
R522 220
R523 4.7k
C523 47/10V
R527 10M
R528 1.5M
FROM TR811-B
IC550-1
-8V +8V +5V
TO PEF-759
P1204
IC501 74S74



SWEEP GEN (PEF-621 2/5)


+8V
R806 47
7.83V
C806 470/10V
(X1)
C811 10P
R813 1.2K
R811 2.21KF
TR821 2SA1029D
TR831 2SA1029D
FROM P1204-6
5 3D
R801 6.8k
TR811 2SC458C
R821 2.2K
C823 15P
R824 6.8 k
R831 270
R832 22
R802 220
C801 47/10V
R807 220
R808 1K
28.9mA
RV 821 2K
R823 10
H·GAIN
C832 22P
(R803) JP
C809 47 10V
TR812 2SC458C
-8V
R822 2.2K
RV824 10K
RV831 500
R831 2.21KF
TR832 2SA1029D
0.985mA
20.8V
R812 2.21KF
R814 1.2K
TR822 2SA1029D
R804 10K
C812 10P
MAG CENT
MAG GAIN
C805 0.01
+8V
H·POSI
R805 470
RV805 10K
P510
P802
R867 JP
R868 JP
-8V
PULL X10 MAG
(X1)
(X10)
NORM
R860 26.7KF
5mA
R866 33.2KF
+7.5V

PEF-621F 3/5


R851 22K 1/2W
R859 * 470
8
+220V UNREG
*:R859:R.FUSING
R853 22K 1/2W
R855 22K 1/2W
C857 4700P 500V
TR853 2SC2610
C845 2P 500V
D851 1SS133
R845 100K 1W
R871 100
X
TO CRT PEF-626 P1032
7
-8V
2.8mA
2mA
C847 22P
C880 0.01
R880 220
R857 330
D853 1SS133
TR843 2SA1029D
C874 100P
TR851 2SC2610
R874 220
R841 3.92KF
C840 *
CV840 ~40P
R843 3.3K
+8V
R833 2.21KF
R847 68
-8V
R840 470
R844 3.3K
R873 220
TR852 2SC2610
R842 3.92KF
TR844 2SA1029D
C873 100P
D854 1SS133
R858 330
R881 220
-8V
C848 22P
R846 100K 1W
D852 1SS133
X+
TO CRT PEF-626 P532 P1032
7
R872 100
C846 2P 500V
L852 6.8mH
TR854 2SC2610
R856 22K 1/2W
R854 22K 1/2W
R852 22K 1/2W
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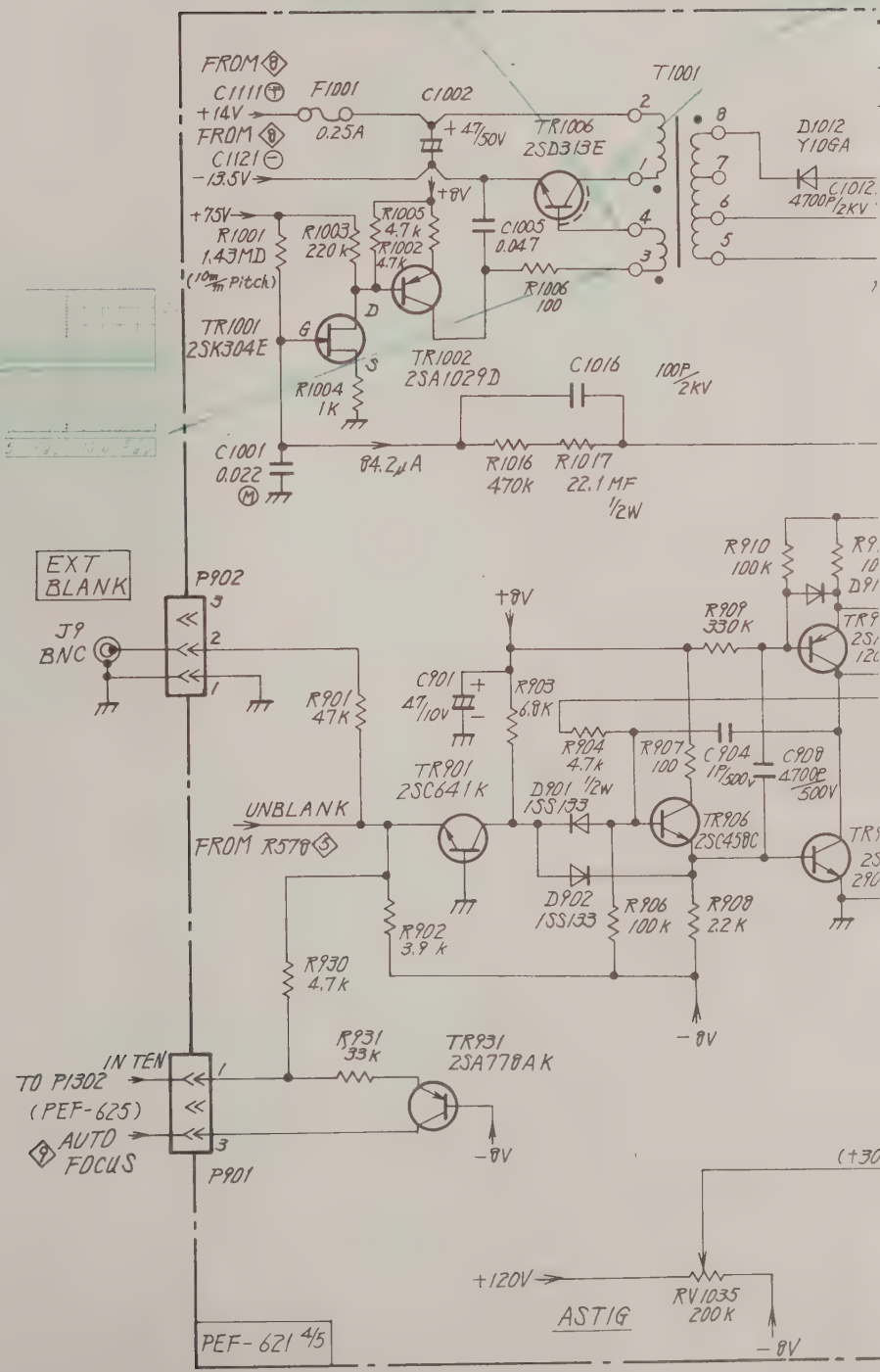
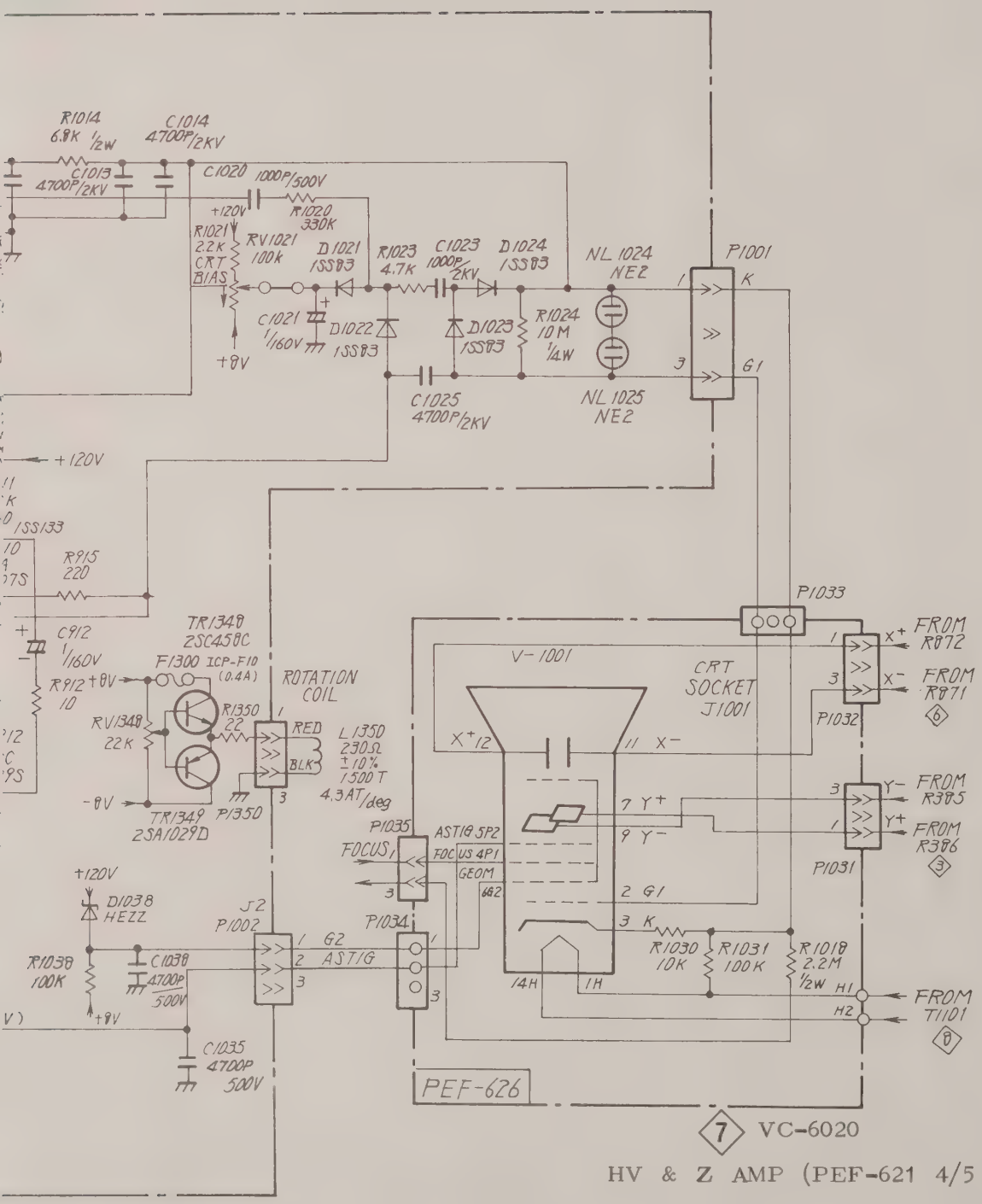
H - AMP (PEF-621 3/5)


FROM C1111 +14V
FROM C1121 −13.5V
F1001 0.25A
C1002 +47/50V
T1001
TR1006 2SD313E
D1012 Y10GA
C1012 4700P/2KV
+8V
+75V
R1001 1.43MD (10mm Pitch)
R1003 220K
R1005 4.7K
R1002 4.7K
C1005 0.047
R1006 100
TR1001 2SK304E
TR1002 2SA1029D
R1004 1K
C1016 100P/2KV
C1001 0.022
84.2μA
R1016 470K
R1017 22.1MF 1/2W
EXT BLANK
P902
J9 BNC
R901 47K
C901 47/10V
R903 6.8K
R904 4.7K
R907 100
C904 1P/500V
C908 4700P/500V
R909 330K
R910 100K
TR901 2SC641K
D901 1/2W 1SS133
TR906 2SC458C
UNBLANK
FROM R578
D902 1SS133
R902 3.9K
R906 100K
R908 2.2K
R930 4.7K
R931 33K
TR931 2SA778AK
IN TEN
TO P1302 (PEF-625)
AUTO FOCUS
P901
−8V
+120V
RV1035 200K
ASTIG
PEF-621 4/5



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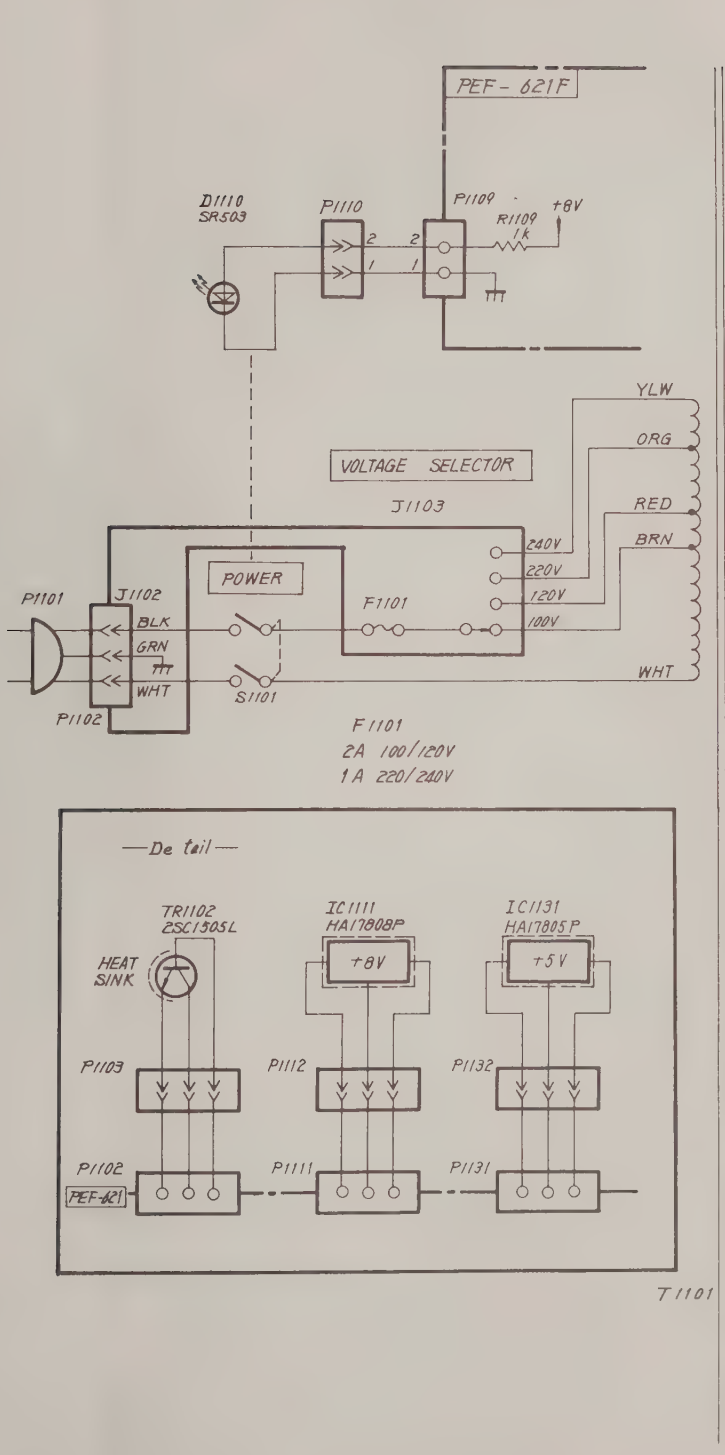
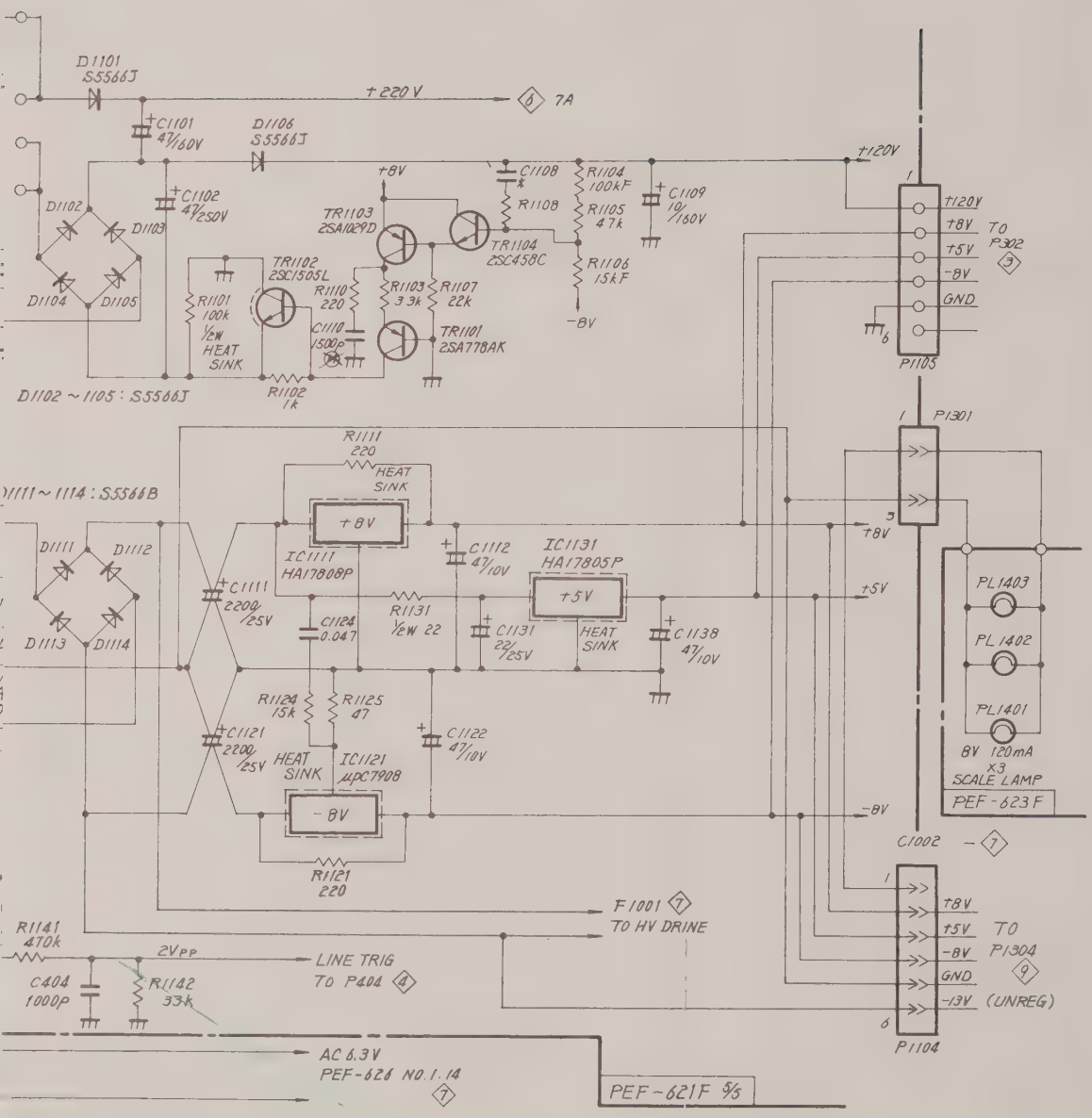
HV & Z AMP (PEF-621 4/5)


PEF-621F
D1110
SR503
P1110
P1109
R1109
1k
+8V
YLW
ORG
RED
BRN
VOLTAGE SELECTOR
J1103
240V
220V
120V
100V
POWER
P1101
J1102
BLK
GRN
WHT
F1101
S1101
P1102
F1101
2A 100/120V
1A 220/240V
—De tail—
TR1102
2SC1505L
HEAT SINK
IC1111
HA17808P
+8V
IC1131
HA17805P
+5V
P1103
P1112
P1132
P1102
PEF-621
P1111
P1131
T1101
BRN
RED
125V
YLW
0 V
GRN
BLK
PPL
11.6V
P1101
BLU
6.3V
BLU
RED
BLK
GRY
BLK
WHT



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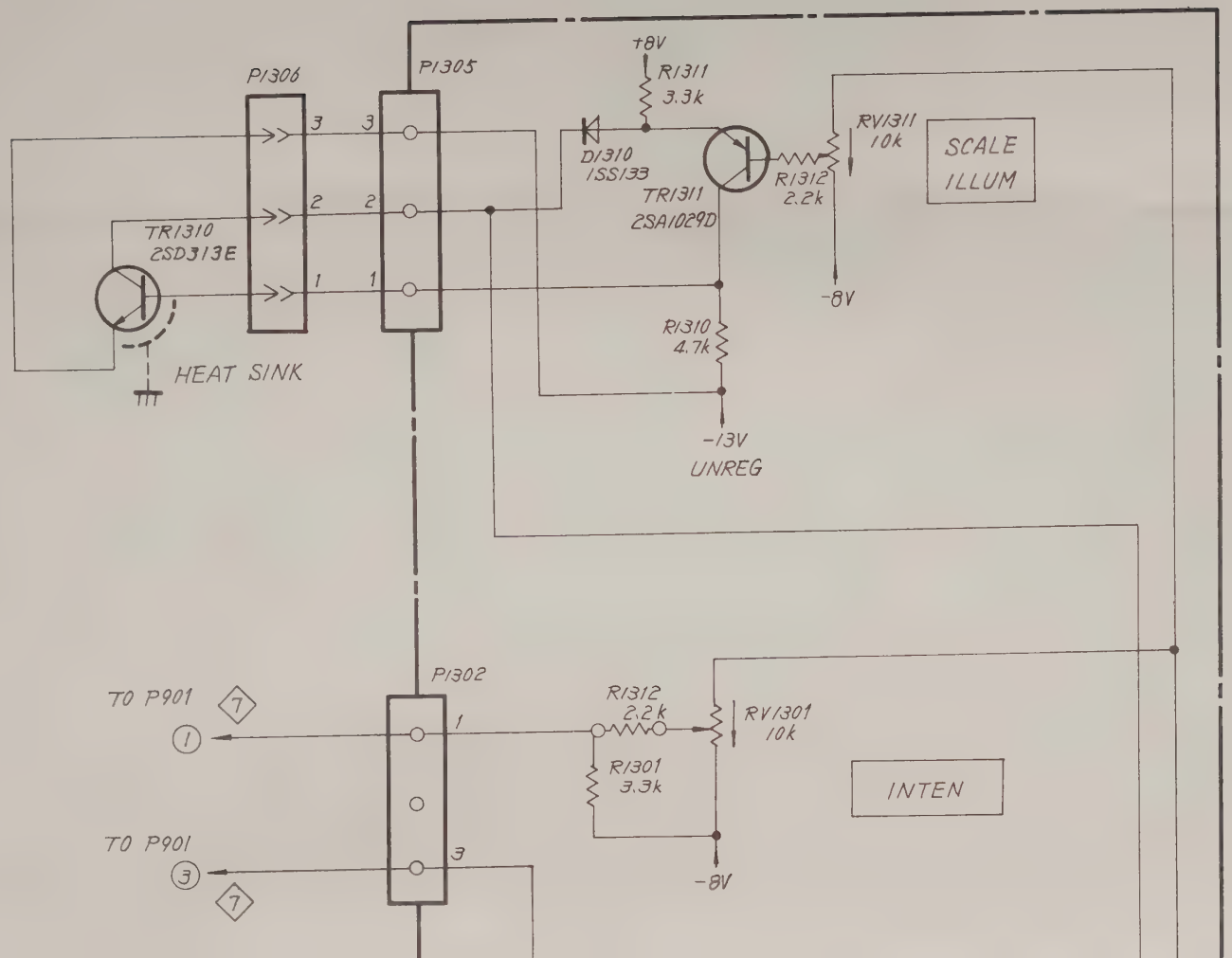
POWER SUPPLY (PEF-621 5/5)


P1306
P1305
+8V
R1311
3.3k
D1310
1SS133
TR1311
2SA1029D
R1312
2.2k
RV1311
10k
SCALE
ILLUM
-8V
TR1310
2SD313E
HEAT SINK
R1310
4.7k
-13V
UNREG
P1302
TO P901
7
1
R1312
2.2k
RV1301
10k
R1301
3.3k
INTEN
-8V
TO P901
3
7

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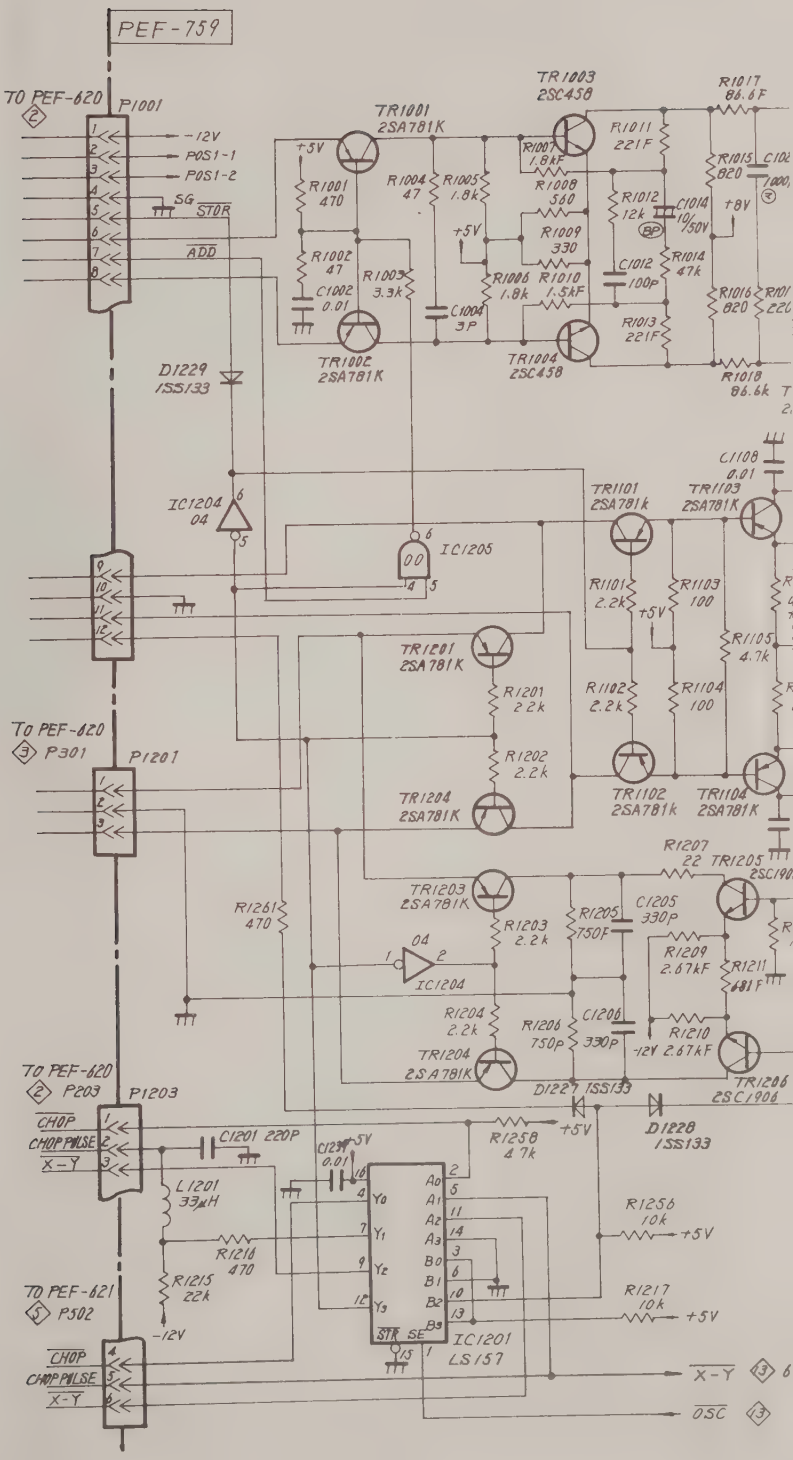
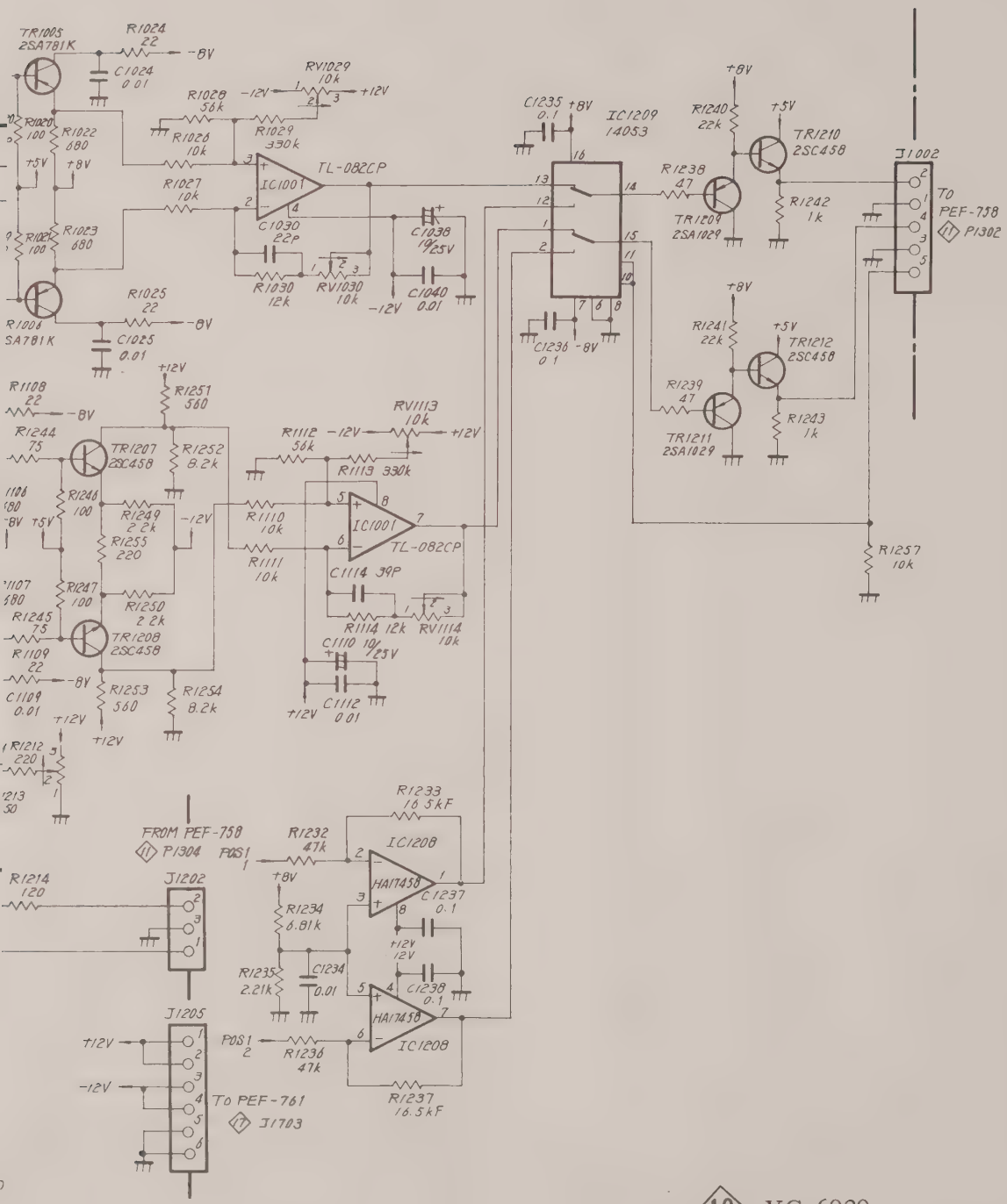
RV & LAMP (PEF-625)


PEF-759
TO PEF-620
P1001
-12V
POS1-1
POS1-2
SG
STOR
ADD
TR1001 2SA781K
TR1002 2SA781K
TR1003 2SC458
TR1004 2SC458
R1001 470
R1002 47
R1003 3.3k
R1004 47
R1005 1.8k
R1006 1.8k
R1007 1.8kF
R1008 560
R1009 330
R1010 1.5kF
R1011 221F
R1012 12k
R1013 221F
R1014 47k
R1015 820
R1016 820
R1017 86.6F
R1018 86.6k
C1002 0.01
C1004 3P
C1012 100P
C1014 10/50V
+5V
+8V
D1229 1SS133
IC1204 04
IC1205 00
TR1101 2SA781K
TR1102 2SA781K
TR1103 2SA781K
TR1104 2SA781K
R1101 2.2k
R1102 2.2k
R1103 100
R1104 100
R1105 4.7k
C1108 0.01
TR1201 2SA781K
TR1204 2SA781K
R1201 2.2k
R1202 2.2k
TO PEF-620
P301
P1201
TR1203 2SA781K
TR1205 2SC1906
R1203 2.2k
R1204 2.2k
R1205 750F
R1206 750p
R1207 22
R1209 2.67kF
R1210 2.67kF
R1211 681F
R1261 470
C1205 330P
C1206 330P
-12V
D1227 1SS133
D1228 1SS133
TO PEF-620
P203
P1203
CHOP
CHOP PULSE
X-Y
C1201 220P
C1234 0.01
R1258 4.7k
L1201 33μH
R1218 470
R1215 22k
R1256 10k
R1217 10k
TO PEF-621
P502
IC1201 LS157
STR
SE
X-Y
OSC



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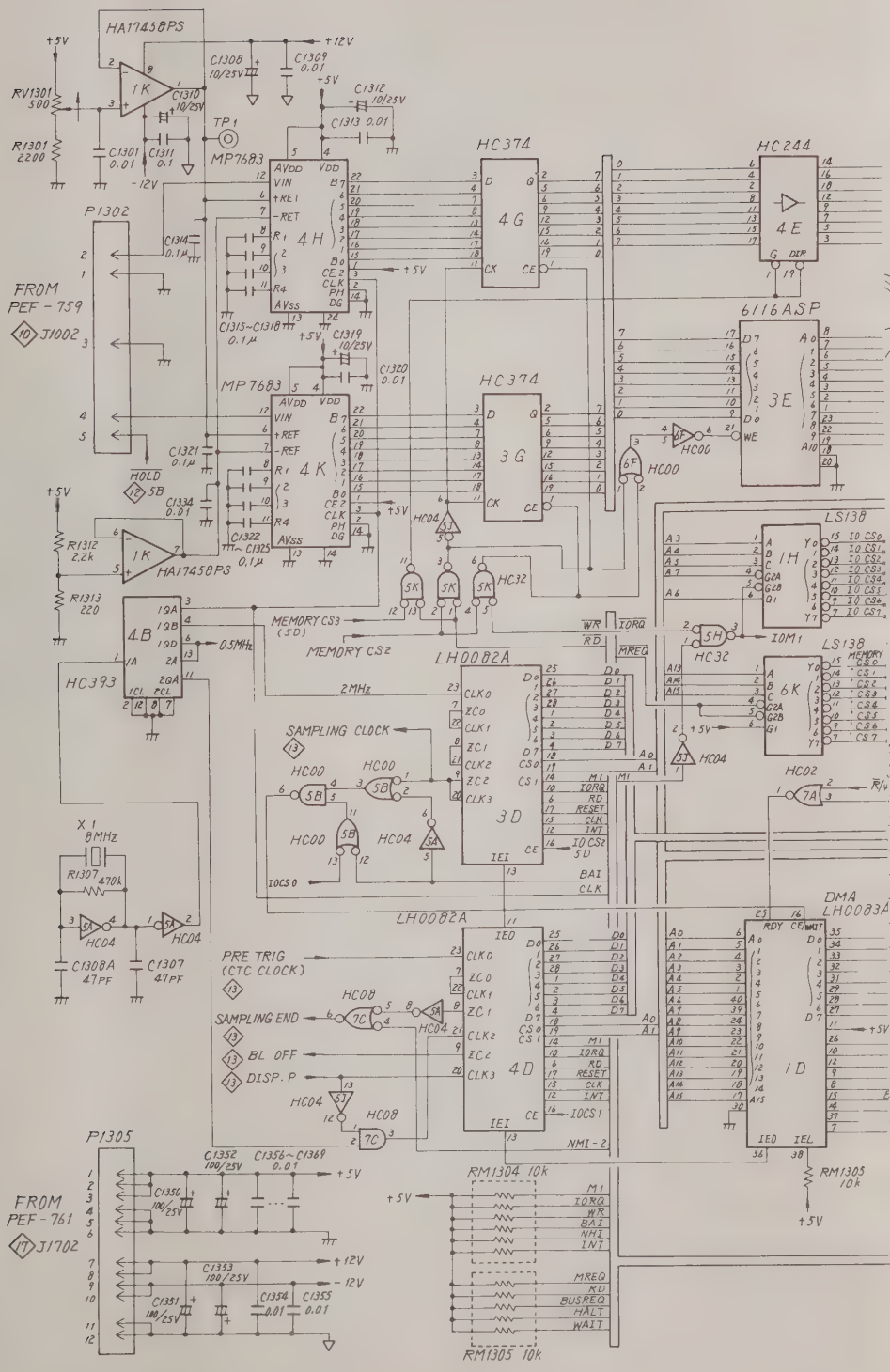
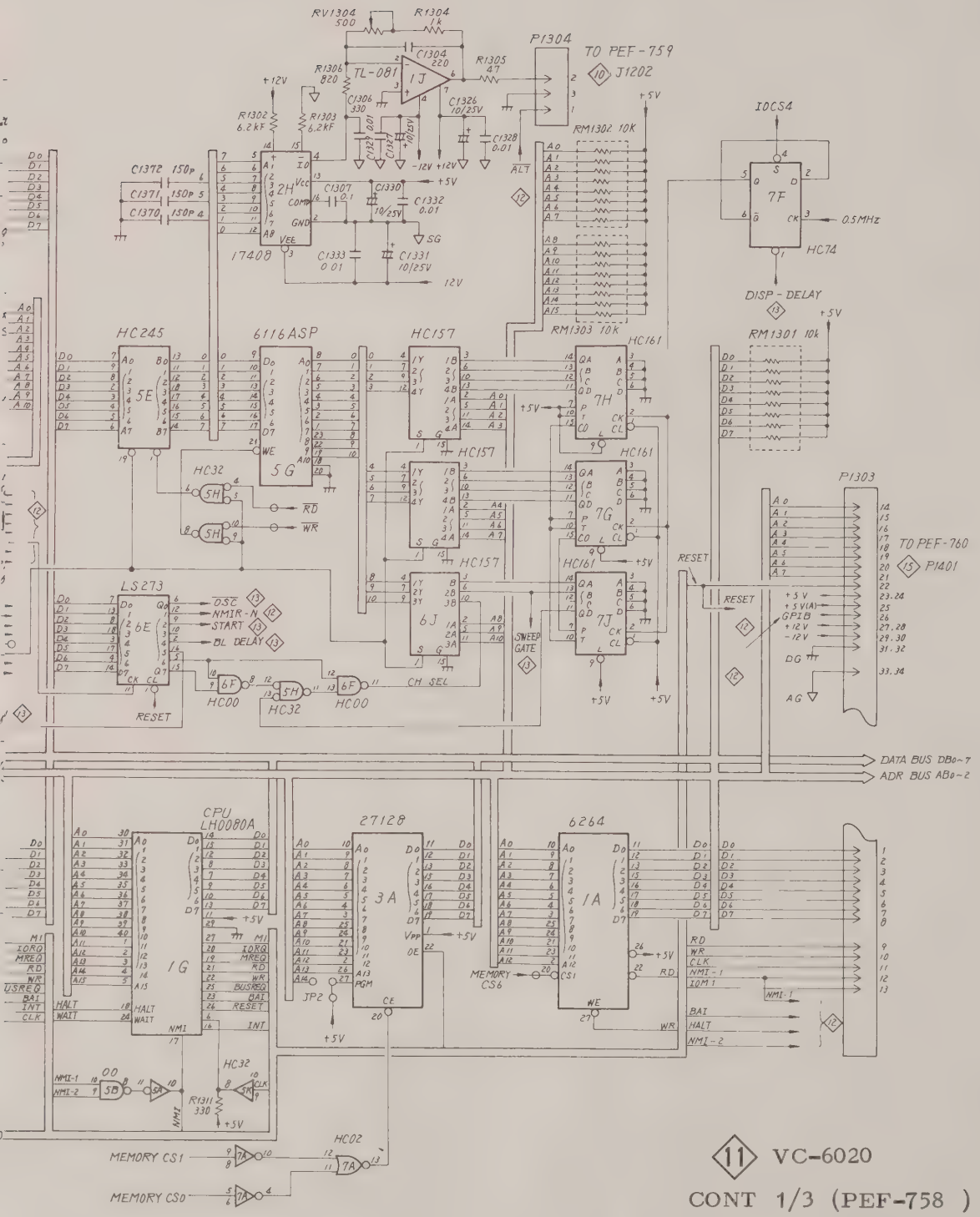
AD PR AMP 1/2 (PEF-759)


HA17458PS
MP7683
HC374
HC244
6116ASP
LS138
LH0082A
HC393
HC32
HC00
HC04
HC08
HC02
DMA
LH0083A
FROM PEF-759
FROM PEF-761
P1302
P1305
SAMPLING CLOCK
PRE TRIG (CTC CLOCK)
SAMPLING END
BL OFF
DISP. P
MEMORY CS3 (5D)
MEMORY CS2
RM1304 10k
RM1305 10k



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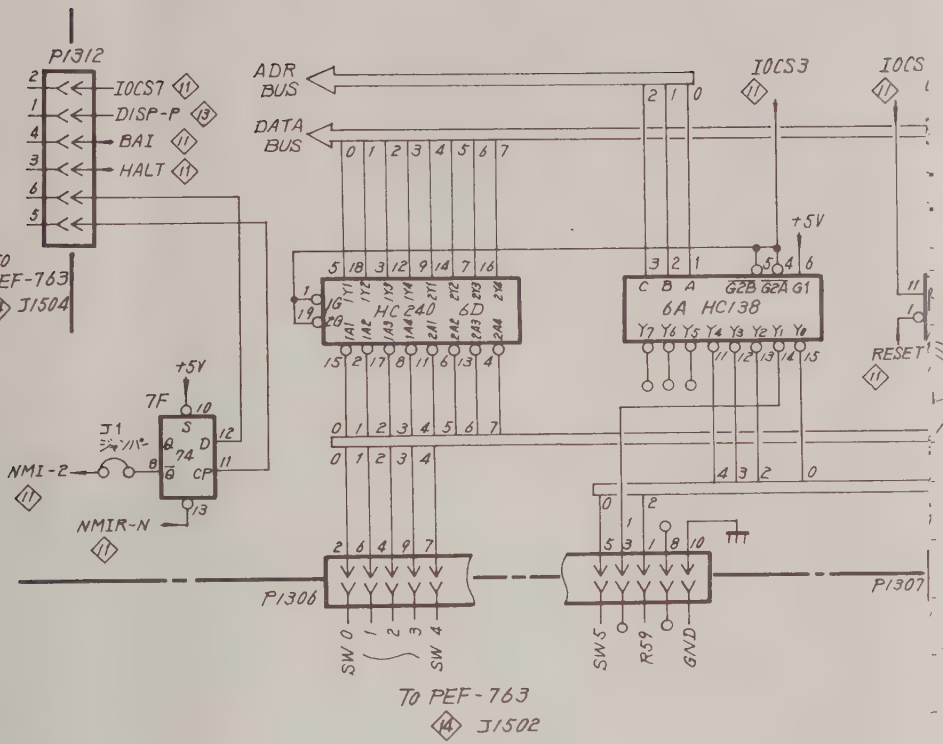
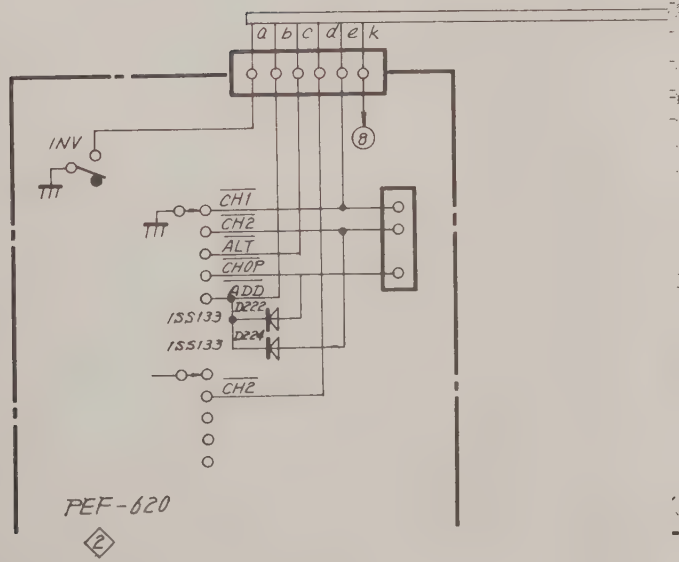
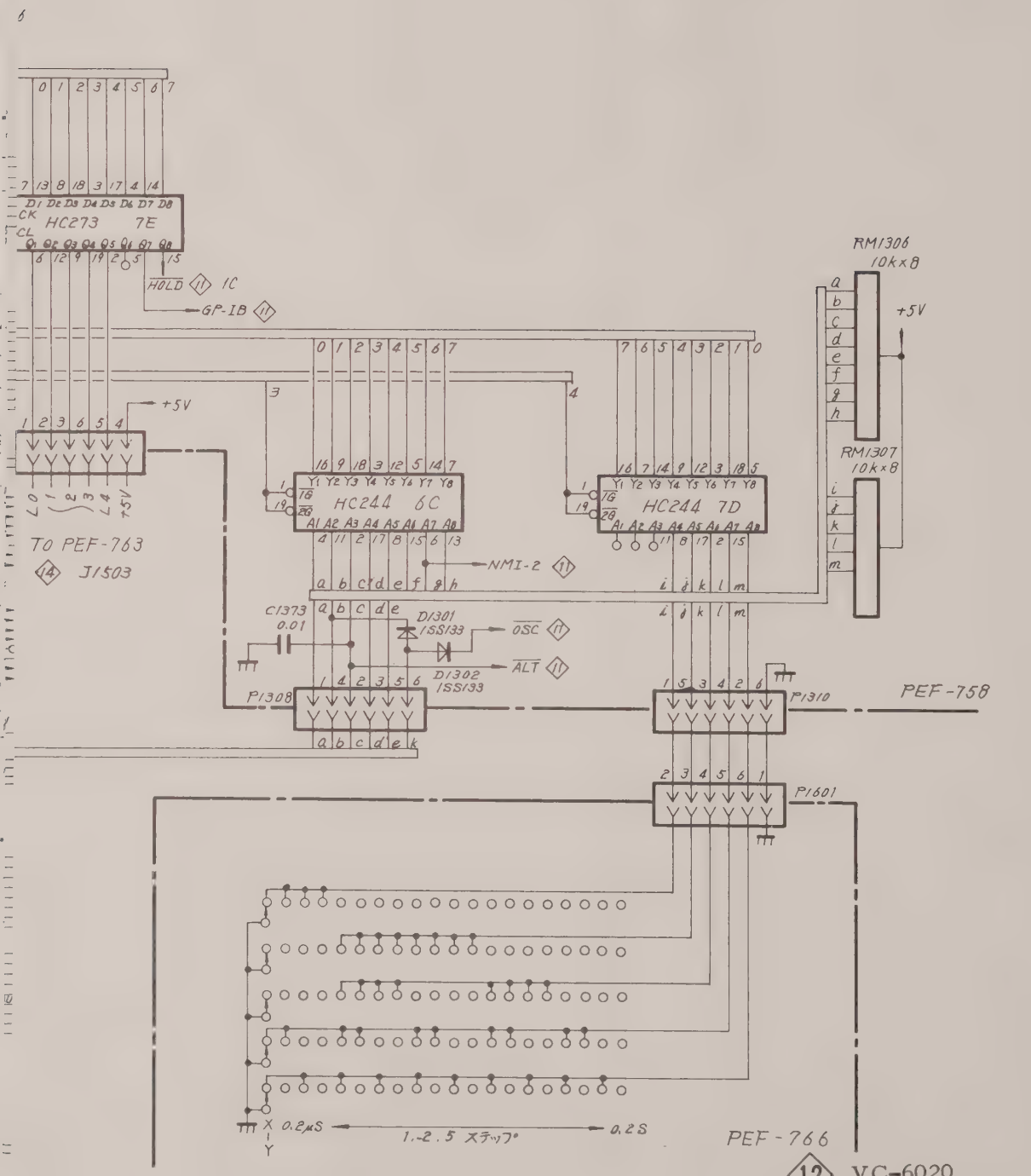
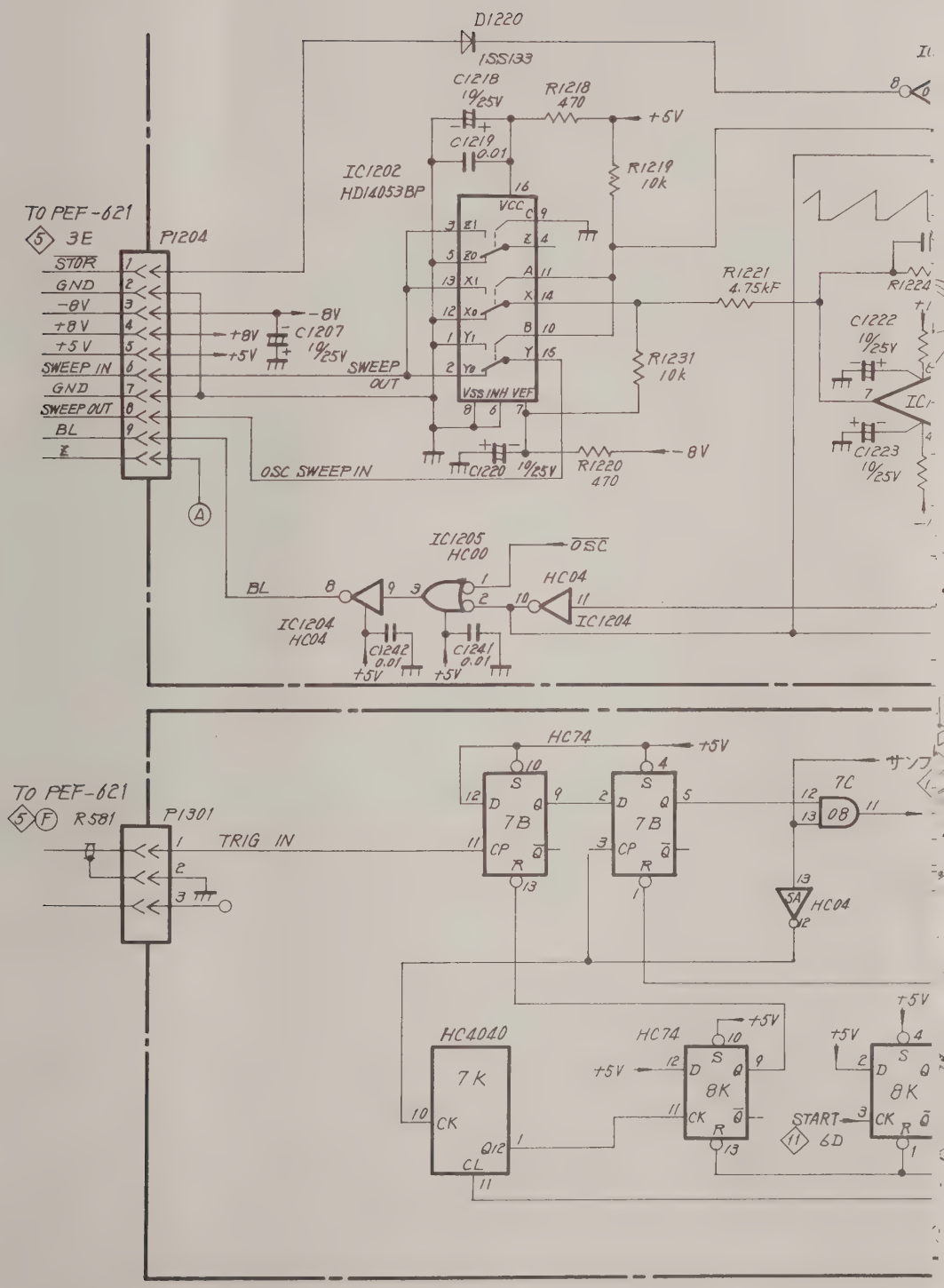
CONT 1/3 (PEF-758)

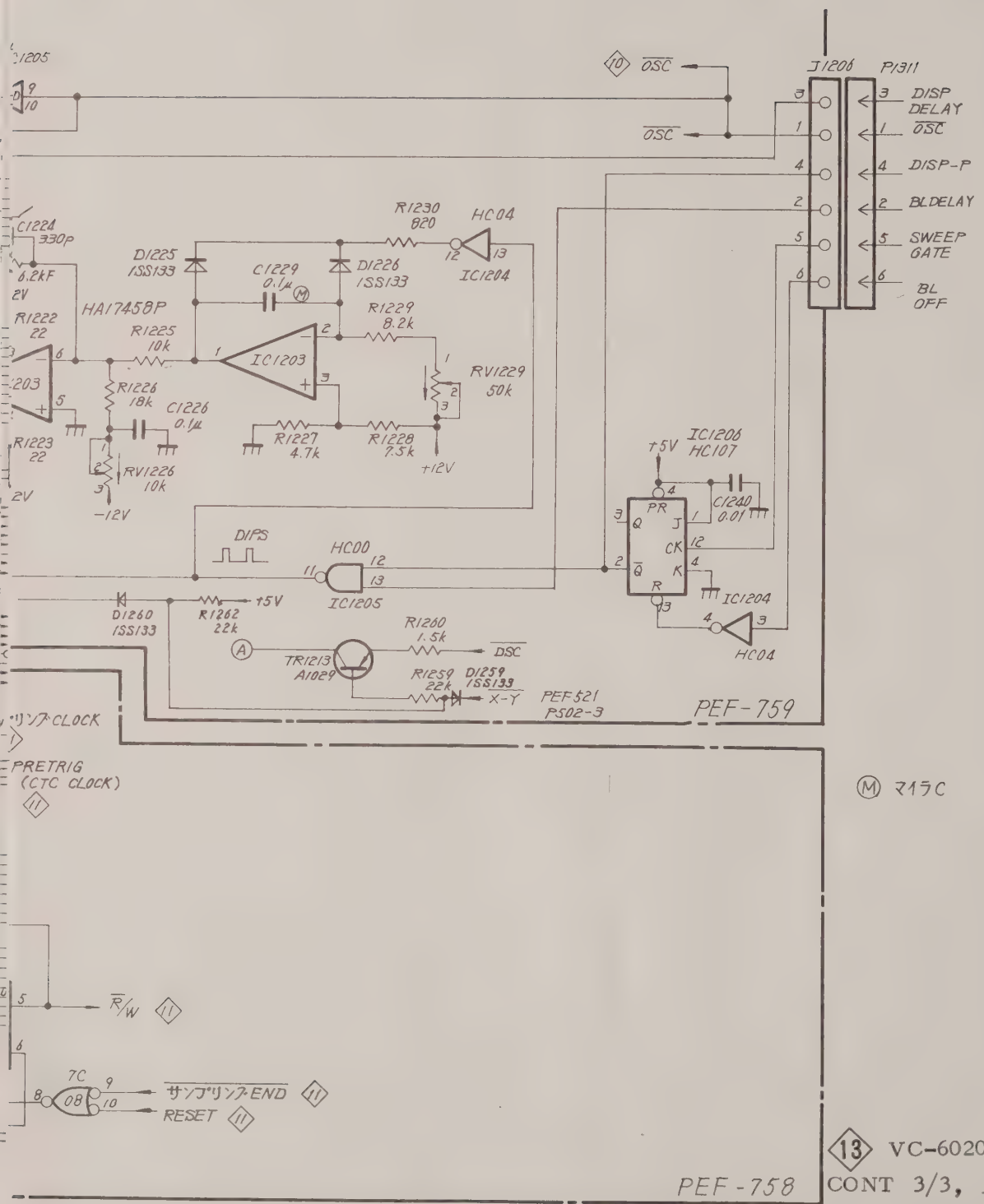

P1312
IOCS7
DISP-P
BAI
HALT
TO PEF-763 J1504
ADR BUS
DATA BUS
IOCS3
IOCS
RESET
+5V
7F
74
J1 ジャンパー
NMI-2
NMIR-N
HC240 6D
6A HC138
P1306
P1307
SW 0 1 2 3 4
SW5
RS9
GND
TO PEF-763 J1502


a b c d e k
INV
CH1
CH2
ALT
CHOP
ADD
1SS133
D222
D224
1SS133
CH2
PEF-620

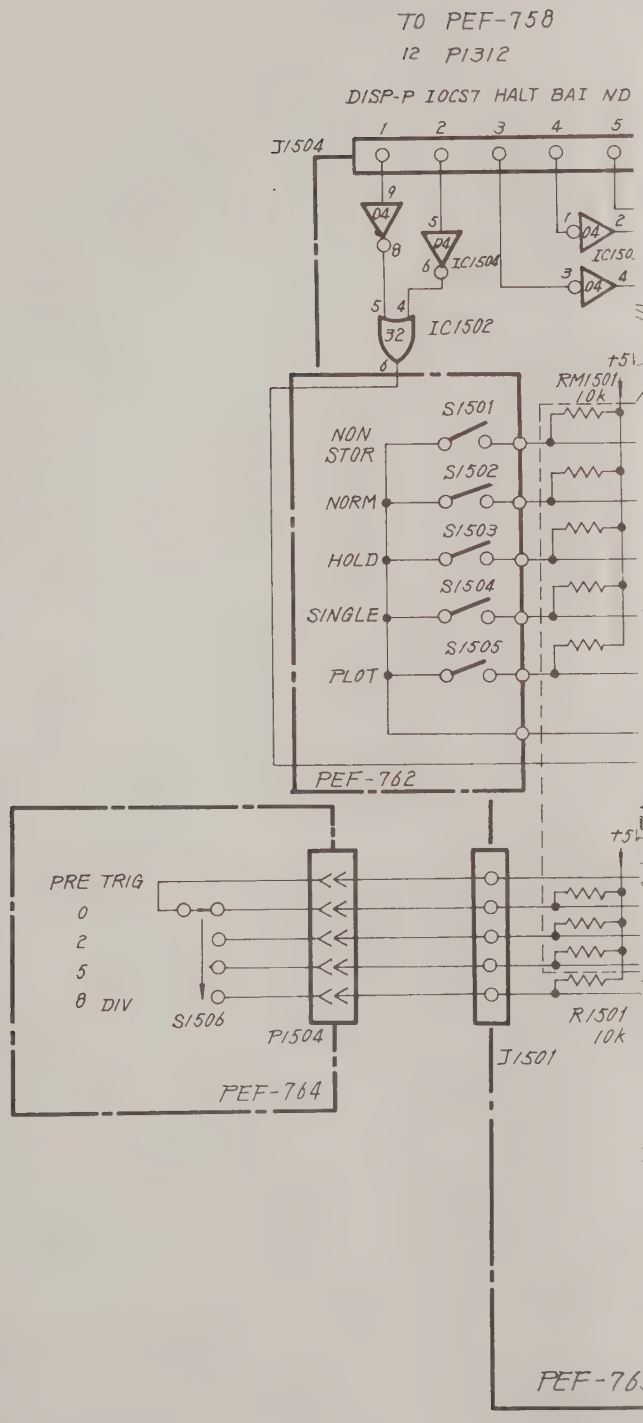


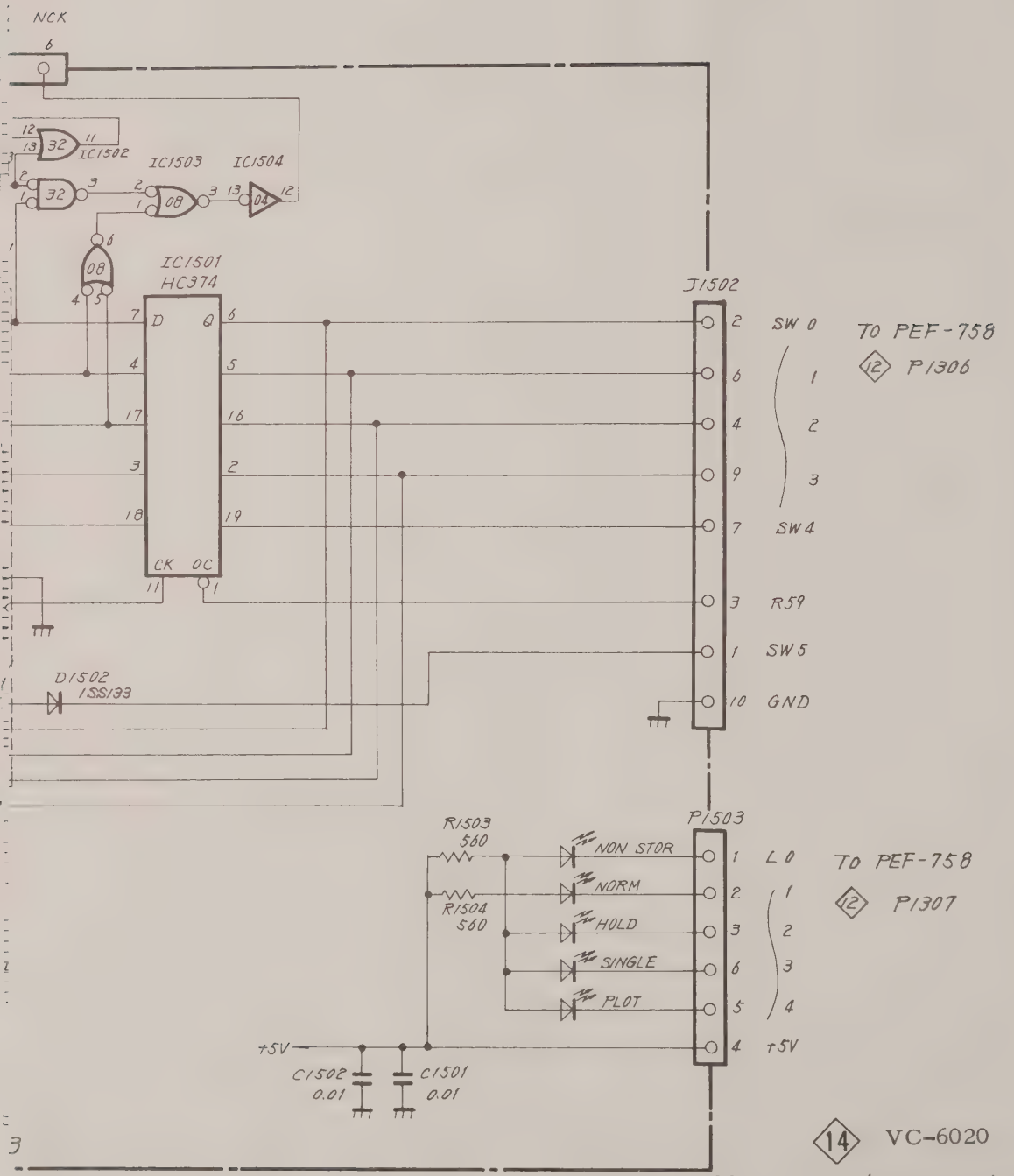
CONT 2/3 (PEF-758)


D1220
1SS133
C1218
10/25V
R1218
470
+5V
C1219
0.01
R1219
10k
IC1202
HD14053BP
VCC
VSS INH VEF
TO PEF-621
5 3E
P1204
STOR
GND
-8V
+8V
+5V
SWEEP IN
GND
SWEEP OUT
BL
E
C1207
10/25V
SWEEP OUT
OSC SWEEP IN
C1220
10/25V
R1220
470
R1221
4.75kF
R1231
10k
C1222
10/25V
R1224
C1223
10/25V
IC1205
HC00
OSC
HC04
IC1204
IC1204
HC04
C1242
0.01
C1241
0.01
TO PEF-621
5 F R581
P1301
TRIG IN
HC74
7B
7B
7C
08
HC04
HC4040
7K
HC74
8K
8K
START
11 6D



13 VC-6020 CONT 3/3, AD PR AMP 2/2 (PEF-758/759)


TO PEF-758
12 P1312
DISP-P IOCST HALT BAI ND
J1504
1 2 3 4 5
IC1504
IC1502
32
+5V
RM1501
10k
S1501
NON STOR
S1502
NORM
S1503
HOLD
S1504
SINGLE
S1505
PLOT
PEF-762
PRE TRIG
0
2
5
8 DIV
S1506
P1504
J1501
R1501
10k
PEF-764
PEF-76



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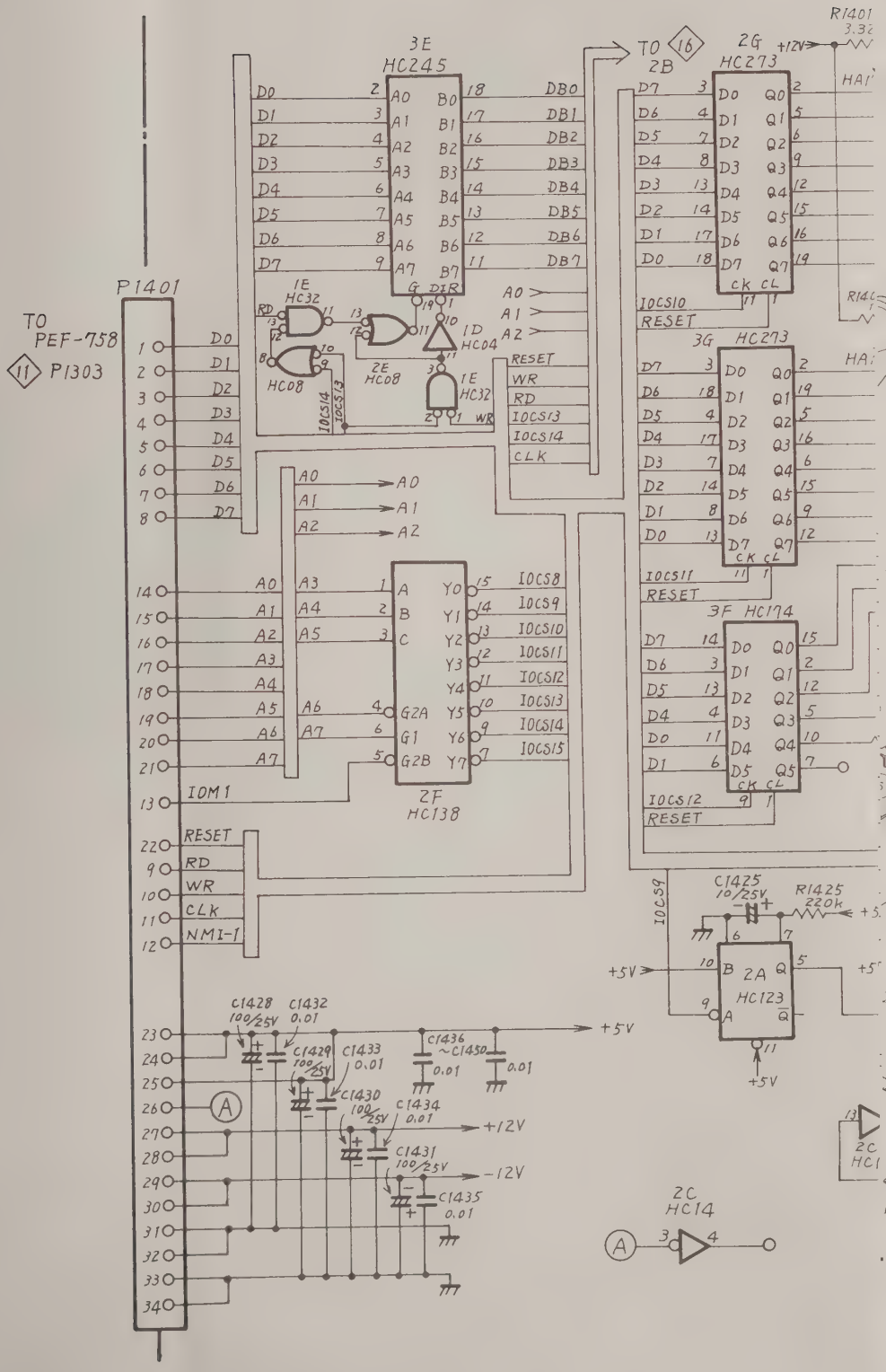
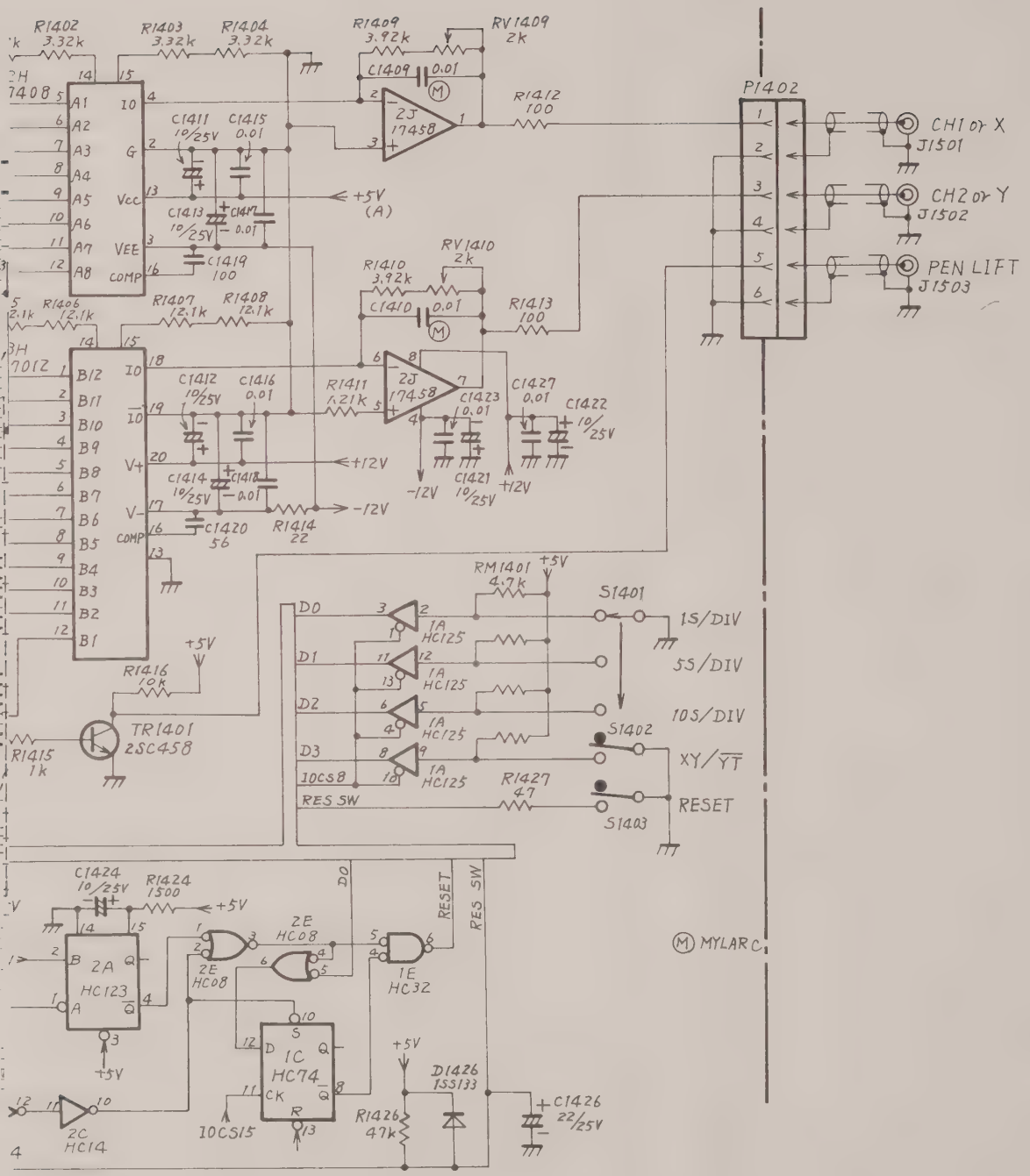
MODE SW (PEF-762/763 /764)


P1401
TO PEF-758
11 P1303
3E HC245
TO 2B
16
2G HC273
3G HC273
3F HC174
1E HC32
1D HC04
2E HC08
HC08
ZF HC138
IOM1
RESET
RD
WR
CLK
NMI-1
IOCS8
IOCS9
IOCS10
IOCS11
IOCS12
IOCS13
IOCS14
IOCS15
C1425 10/25V
R1425 220k
HC123
C1428 100/25V
C1432 0.01
C1429 100/25V
C1433 0.01
C1430 100/25V
C1434 0.01
C1431 100/25V
C1435 0.01
C1436 ~C1450 0.01
+5V
+12V
-12V
2C HC14
R1401 3.3



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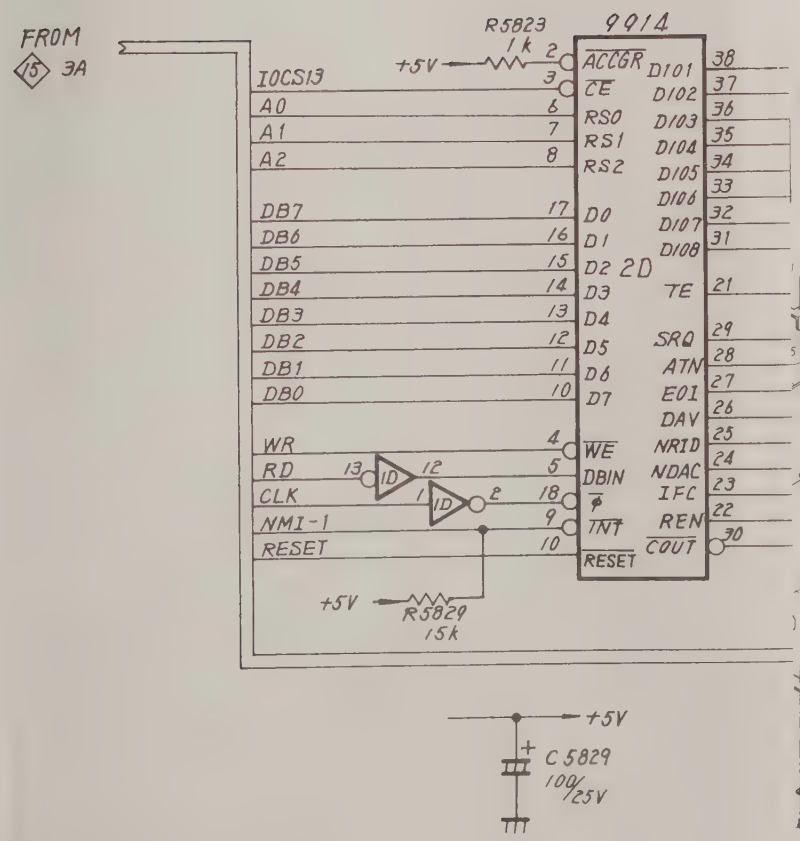
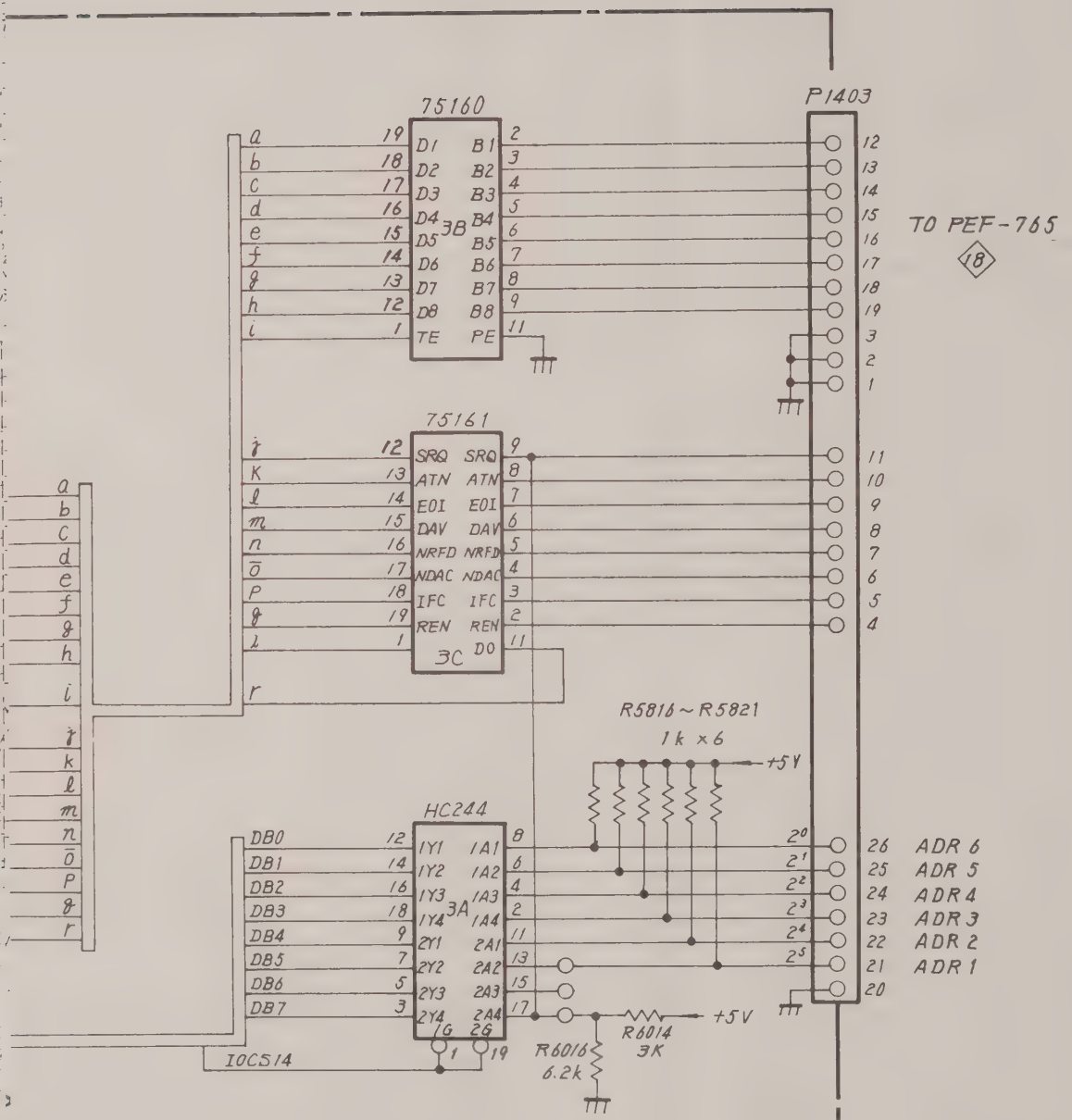
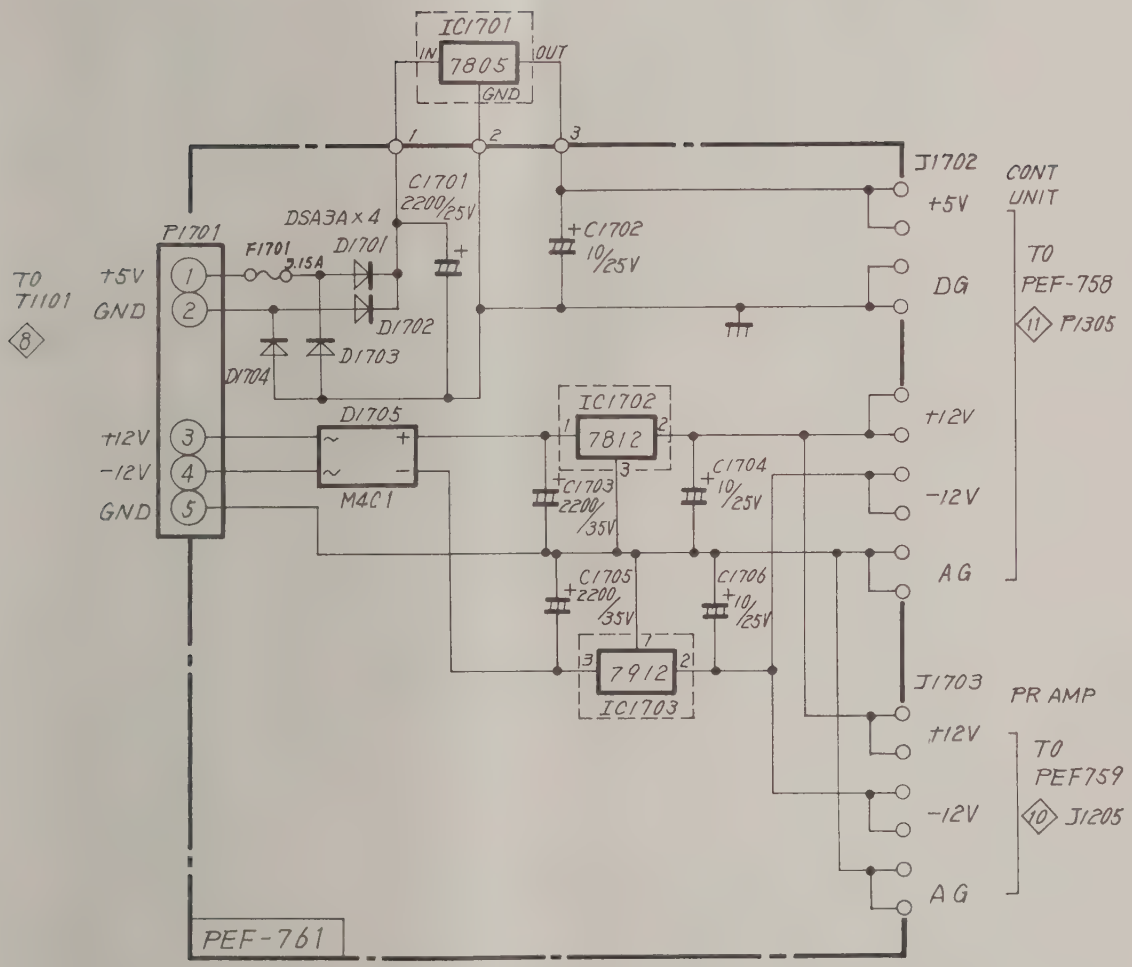
PLOT (PEF-760)


FROM
15 3A
R5823
1k
+5V
9914
ACCGR
CE
RS0
RS1
RS2
D0
D1
D2
D3
D4
D5
D6
D7
WE
DBIN
INT
RESET
D101
D102
D103
D104
D105
D106
D107
D108
TE
SRQ
ATN
EOI
DAV
NRID
NDAC
IFC
REN
COUT
2D
IOCS13
A0
A1
A2
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
WR
RD
CLK
NMI-1
RESET
1D
R5829
15k
C5829
100/25V


75160
3B
D1
D2
D3
D4
D5
D6
D7
D8
TE
B1
B2
B3
B4
B5
B6
B7
B8
PE
P1403
TO PEF-765
18
75161
3C
SRQ
ATN
EOI
DAV
NRFD
NDAC
IFC
REN
DO
R5816~R5821
1k ×6
+5V
HC244
3A
1G
2G
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
IOC514
R6016
6.2k
R6014
3K
ADR 6
ADR 5
ADR 4
ADR 3
ADR 2
ADR 1
PEF-760
16
VC-6020

GP-IB (PEF-760)



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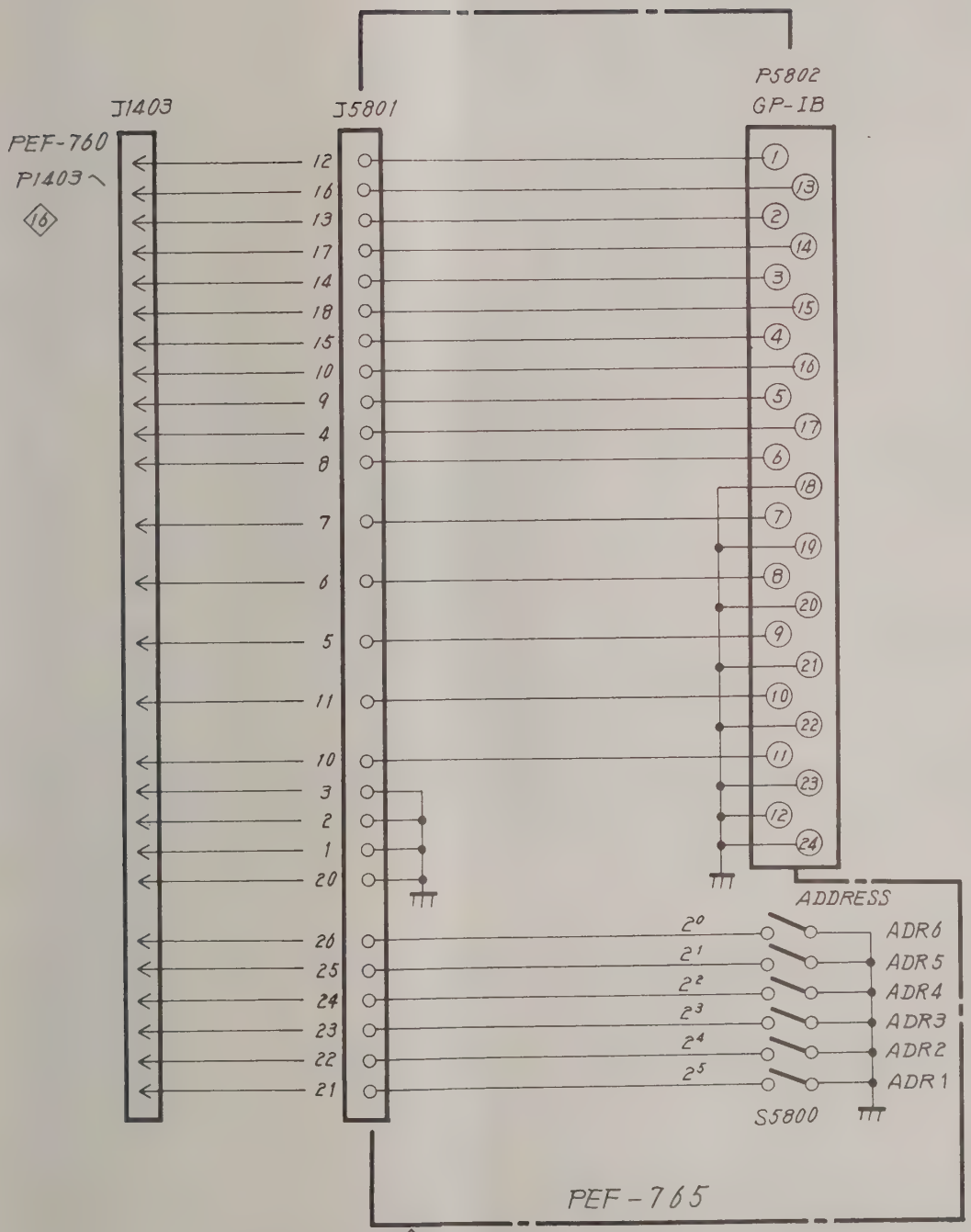
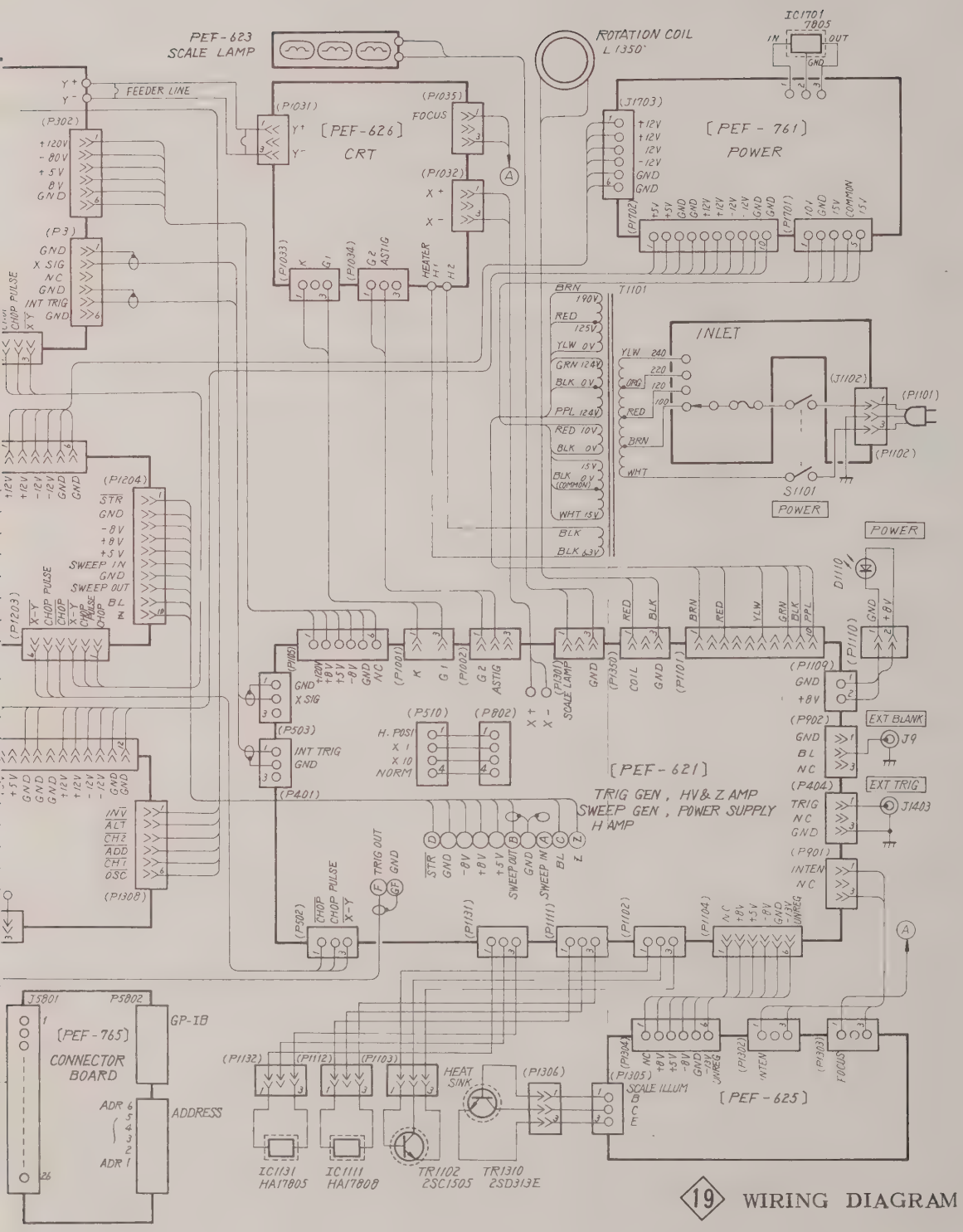
POWER (PEF-761)

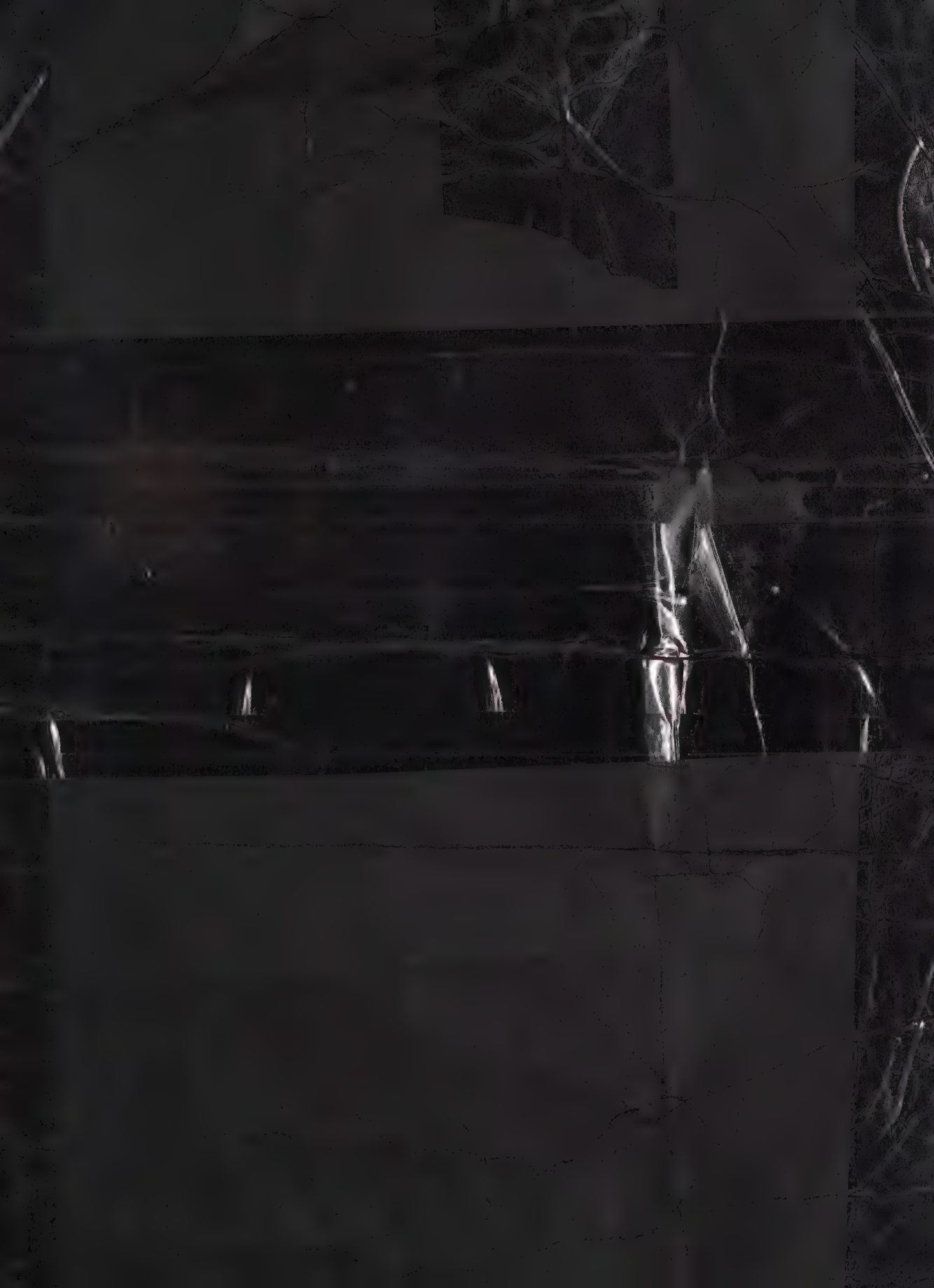


18 VC-6020
CONNECTOR BOARD (PEF-765)

S202
CH1
CH2
MODE
CH1 OUT
J80
[PEF - 620]
IN PUT AMP
PRE AMP & TRIG PICK OFF
V OUT
CH1 ORX
J1
CH2 ORY
J101
[PEF-622]
DC OFF SET
VOLT OUT
J5
GND
J99
IN
GND
DC OFF SET OUT
P251
P250
0.5V CAL
J1201
[PEF-762]
[PEF-766]
PR TRIG
[PEF-763]
SW I/F
[PEF-759]
A/D AMP, D/A OUT
[PEF-758]
CONT
[PEF-764]
TIME
ROTARY
[PEF-760]
PLOT
J1501
CH1 ORX
J1502
CH2 ORY
J1503
PEN LIFT



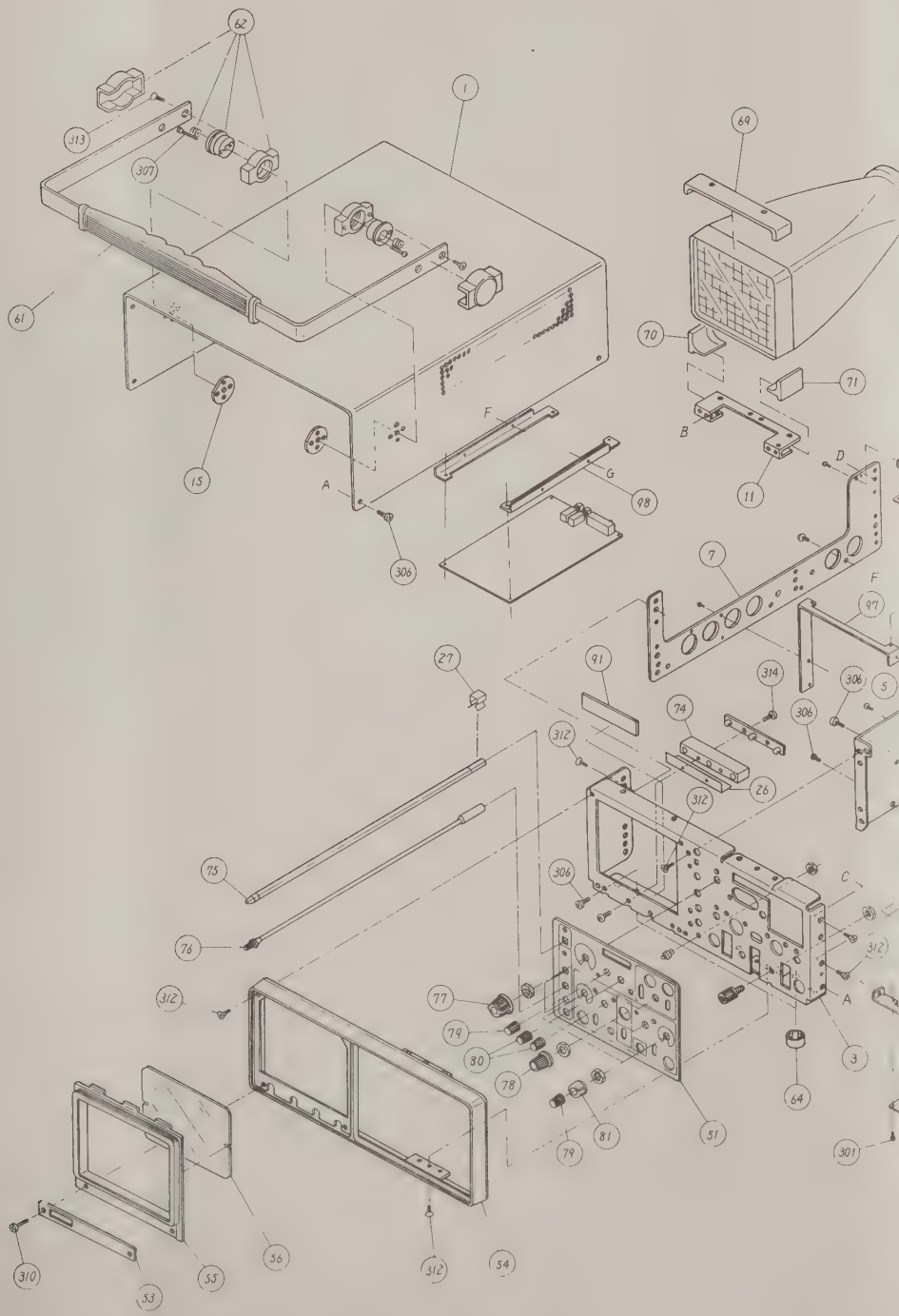
19 WIRING DIAGRAM

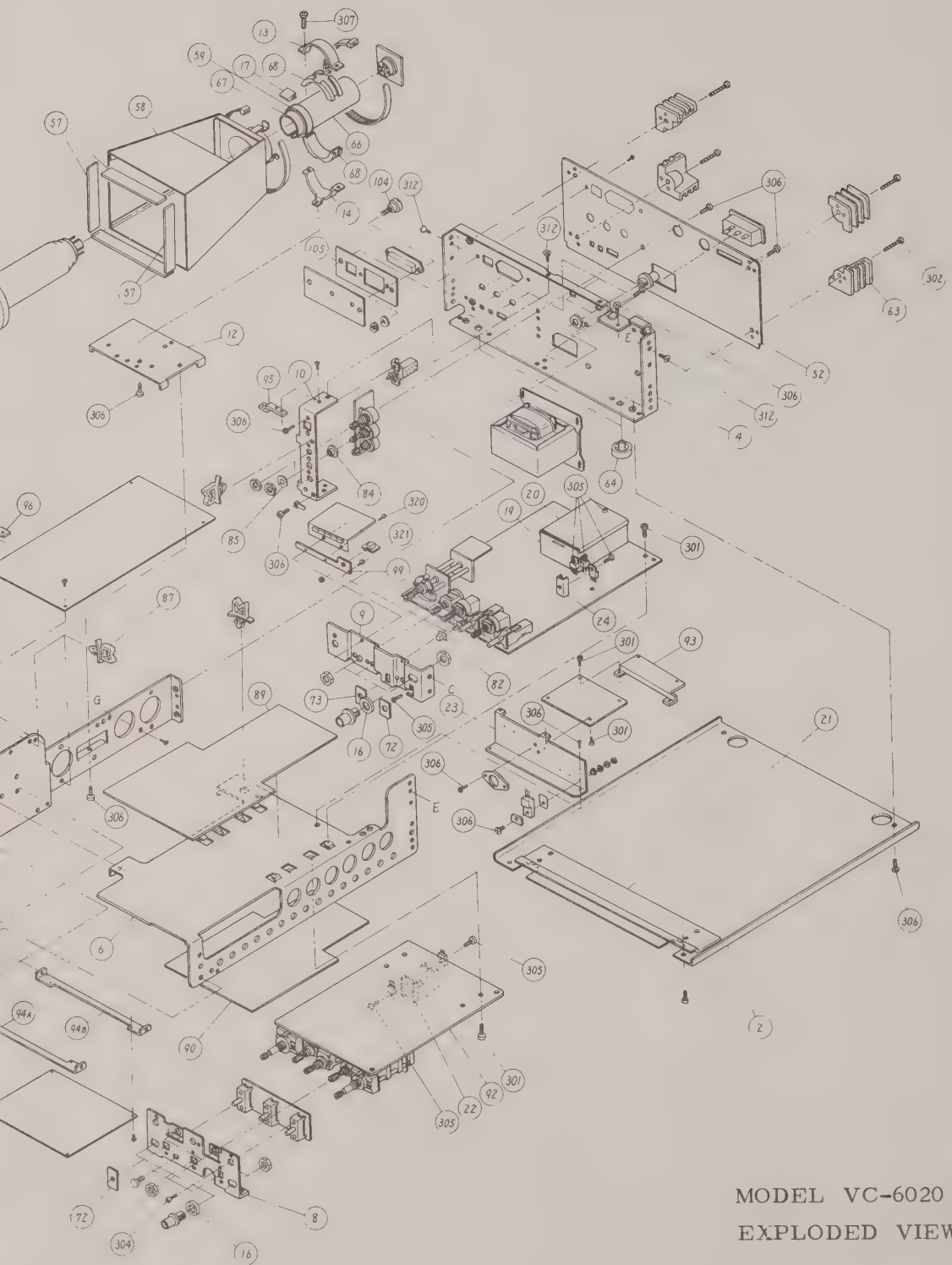


10. MECHANICAL PARTS LIST AND EXPLODED VIEW

Symbol	Part Code	Description	Q'ty
1	3198665A	Cover	1
2	3205658A	Cover Bottom	1
3	2117818A	Chassis Front	1
4	2117819AA	Chassis Rear	1
5	2117820AA	Chassis C	1
6	2118181AA	Chassis P	1
7	3204047AA	Chassis L	1
8	3177959A	Bracket	1
9	3204048A	Bracket	1
10	8459491A	Bracket	1
11	8398472A	Bracket CRT	1
12	8398473A	Bracket CRT	1
13	8398474A	CRT Band	1
14	8398475A	CRT Band	1
15	8398476A	Nut Plate	2
16	8398477A	Spacer BNC	3
17	8446132A	Plate, Earth	1
19	3180079A	Shield Case HV	1
20	8400305A	Shield Cover HV	1
22	8405457-9A	Heat Sink	1
23	8459492A	Heat Sink	1
24	8419324A	Heat Sink	1
27	8406477A	Stopper	1
30	8405457-8A	Heat Sink	1
51	3200184A	Panel Flont	1
52	3200185A	Panel Rear	1
53	8452646A	Name Plate	1
54	121381C	Front Mask	1
55	2110831D	Bezel	1
56	8395445A	Filter	1
57	8465459A	Cushion	4
58	3205630A	Shield Case	1
59	8448120A	Rubber	1
61	3177922A	Handle	1
62	8377076A	Handle Stopper	2
63	3149317C	Foot	4
64	3140755A	Foot	4
66	8395432A	Shield Band	1
67	8396867A	Rubber Plate	1
68	3144055A	Rubber	2
69	8395443A	Rubber	1
70	8395444A	Rubber	1
71	8395444B	Rubber	1
72	8396868A	Spacer	4
73	8396868B	Spacer	1
74	8395431A	Plate Lamp Guide	1
75	3180083CC	Knob-PW	1
76	3180084CC	Knob-L	3
77	3140804A	Knob-S22	1
78	3196650A	Knob-M	1
79	3149324A	Knob-S18B	3
80	3149324B	Knob-S18B	5
81	3196622A	Knob-ATS	2
82	8383451A	Knob-SW	1
83	8393786A	Label	1
84	8401613A	Insulator	1
85	8401614A	Insulator	1
87	8383455A	Saddle	5

Symbol	Part Code	Description		Q'ty
89	8420813A	Insulator		1
90	8420813B	Insulator		1
91	8405486A	Rubber		1
92	XCI0020	Spacer		1
93	8459493A	Bracket PCB		1
94	8459494A	Bracket PCB		2
95	8459496A	Bracket PCB		1
96	8459497A	Bracket PCB		1
97	8459498A	Bracket PCB		1
98	8459499A	Bracket PCB		1
99	8459500A	Bracket PCB		1
100	8459495A	Bracket PCB		1
101	8459499B	Bracket PCB		1
105	8465485A	Bracket PCB		1
301	XCA0661	Screw Sems	3 x 8	26
302	8340167C	Screw Sems	4 x 20	4
304	XCA6005	Screw	2.6 x 5	3
305	XCA6306	Screw	3 x 6	8
306	XCA6308	Screw	3 x 8	55
307	XCA6316	Screw	3 x 16	6
308	XCA6412	Screw	4 x 12	2
310	XCA1820	Screw	3 x 10	2
312	XCA7306	Screw Flat	3 x 6	21
313	XCA7410	Screw Flat	4 x 10	8
315	XCA0379	Washer Insulator		2
317	XCA6312	Screw	3 x 12	3
318	XCA1817	Screw	3 x 6	4
319	XCA7304	Screw Flat	3 x 4	4
320	XCA1789	Screw	2.6 x 8	2
321	XCA7006	Screw Flat	2.6 x 6	1


62
313
307
1
61
15
A
306
F
G
98
69
70
71
B
11
D
7
F
97
91
27
314
306
5
74
306
312
26
312
75
306
C
76
312
312
77
79
80
78
A
3
64
51
81
79
301
310
53
55
56
312
54



MODEL VC-6020
EXPLODED VIEW

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